

David Lonier
1842 Commonwealth
Auburn Hills, Michigan 48326
248-373-9111

House Energy Policy Committee
124 North Capitol Avenue
Lansing, Michigan 48933

February 21, 2017

Dear Honorable Chairman and members of the House Energy Policy Committee,

I am writing in support of House Bill 4220, as it addresses the concerns that many of us utility customers have about the new smart meters that are being installed upon Michigan homes and businesses.

Besides the meters' assault on utility users' health, privacy and affordability, the new meters are unsafe and prone to exploding, sparking and causing hundreds, if not thousands of fires.

The meters that are used by both Consumers Energy and DTE are the Itron OpenWay meter.

Features that make these meters unsafe are;

1. Flammable (polycarbonate/plastic) outer shell and flammable internal circuit-boards.
2. Small, weak contact points for wireless remote controlled on/off switch, subject to pitting and arcing.
3. Contact between the meter prongs and the spring clamps in the box are weak due to smaller dimension of the connectors on the new meters which could cause reported arcing. Also, the clamps could be pitted due to the age of the box.
4. Switch mode power supply where 240 volts AC are converted to lower DC voltage to operate the delicate circuitry of the meter and the power is then sent into the building as 240 volts AC at a much higher frequency than the 60Hz that was received causing what is known as 'dirty electricity'.
5. The meters are not properly grounded causing surges or lightning strikes to cause circuit burn-outs on the wiring and appliances in the building.
6. Very cheaply constructed, components are made in China. If the meters were constructed according to electrical safety standards, the cost would be greatly increased.
7. For obvious reasons the meters are not approved as safe by UL or any other certifying agency.

Please, for the sake the people's health, privacy and safety...lives are at stake here...take all necessary steps to bring this bill into law.

Respectfully submitted,



David Lonier

Precinct Delegate
2014 Nominee, State House, 29th District

Attachments:

2 Metro-Detroit house fires caused by smart meters

Other Smart Meter Fires/Fatalities

DTE internal document showing their Itron OpenWay 'smart' meter exploding



Livonia house fire starts while installing a smart meter

10/25/ 2013 Livonia Michigan. A fire ripped through a Bayberry Street home during the installation of a smart meter. According to the [Detroit News](#) the fire caused extensive damage. *"DTE spokesman Scott Simons said service technicians were removing an old meter and installing an advanced meter when they saw signs of fire."*

[CBS Detroit](#) also reported on the fire stating the resident Kirk Lytwyn stated: *"A representative from DTE was out here to change the meters and in the process of changing the meters, from what I understand, it blew on him, blew right in his face," Lytwyn said. "Apparently he was wearing the appropriate protective gear."*

Couple escapes house fire, dogs killed: smart meter blamed

October 14, 2014 by [K. T. Weaver](#)

Investigators now admit the smart meter "may have played a role in the fire."



A couple barely escaped a house fire with their lives in Detroit, Michigan, early Sunday morning, October 5th, 2014. Sadly, their two dogs were killed in the blaze.

The homeowner blames the recently installed "smart" meter for the fire.

"It was DTE... why my dogs are dead, why my family is ruined, why I have no house, why I have nothing."

Investigators from Detroit's Fire Department say two circuit boxes were connected to the "smart" meter outside the house and one of them blew, but it wasn't immediately clear to investigators whether the smart meter was the cause of the fire.

However, investigators confirmed on October 7th that the "smart" meter "may have played a role in the fire."

over→

SMART METER FIRES: Fatalities & Liability

- Another 100 smart meters simultaneously explode (Capitola, CA – May 2015)
- Hundreds of smart meters simultaneously explode (Stockton, CA – April 2015)
- Smart meter fire kills 74-year old man in Dallas, Texas (February 2015)
- Man dies in “smart” meter fire (Vacaville, CA – July 2013)
- Fatal fire, smart meter suspected: “Be very aware, very vigilant” says Fire Chief (Reno, NV – Sept 2014)
- Couple escapes house fire, dogs killed: smart meter blamed (Detroit, MI – October 2014)
- SaskPower to replace 105,000 faulty “smart” meters (Saskatchewan, CAN – July 2014)
- SaskPower CEO resigns following investigation into smart meter “catastrophe” (October 2014)
- PGE to replace 70,000 faulty “smart” meters (Portland, OR – July 2014)
- Lakeland Electric to replace over 10,000 faulty “smart” meters (Lakeland, FL – August 2014)
- Are tens of thousands of defective “smart” meters being stealthily replaced in Arizona? (Sept 2014)
- PECO replaces 186,000 faulty “smart” meters (Philadelphia, PA – October 2012)
- News & articles on fires – Take Back Your Power
- Archive of hundreds of documented “smart” meter fires – EMF Safety Network
- Smart Meter Fire Situation Continues to Escalate Kansas City, Mo (August, 2016)
- Ontario Pulls Plug on 36,000 Rural ‘Smart’ Meters Is Big Energy Imploding? (February 10, 2017)
- Smart Meter Fires (2016): Burning meters, burning questions, shocking answers

<https://takebackyourpower.net/1000s-of-smart-meter-fires-new-whistleblower-court-evidence-video/>

DTE Energy

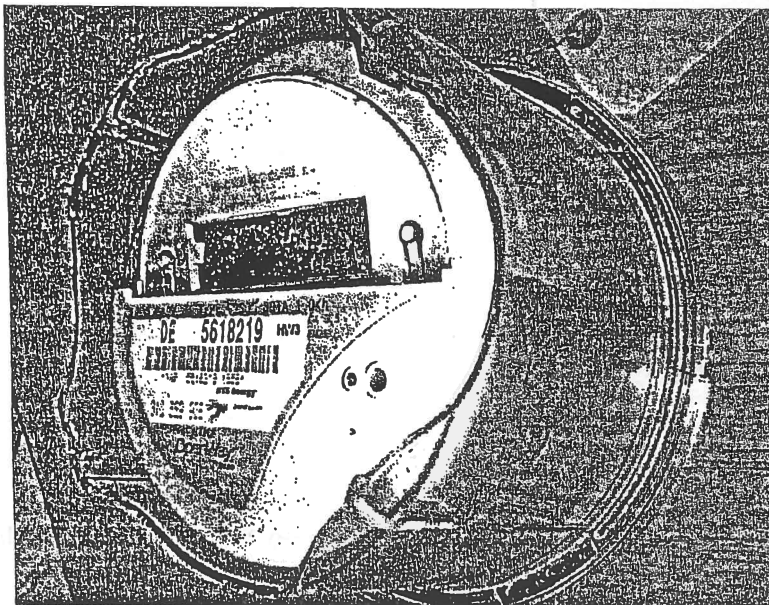
Meter Engineering and Automation Metering Standards Bulletin

Issued By: Meter Engineering	Number: 2015-002	Date Issued: 04/23/2015
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OPENWAY METERS FAILURE UNDER INVESTIGATION

Purpose of Communication

Meter Engineering has identified a handful of OpenWay Centron Form 2S 240V meters that have failed due to overvoltage. As you can see in the picture below the front of the polycarbonate meter cover has been blown off. The investigation is ongoing and your assistance is required.



ACTION Required by All Field Personnel:

Please contact Florin Moldovan of Meter Engineering at (313) 389-7617 to report such sites and assist with the field investigation.

To whom it should concern,

Dec 2015: AMI Smart Meter Installed against my will despite me opting out.

My bills immediately double and almost triple-I can provide proof

I began having memory loss, insomnia, electrical current feelings in body, ringing in ears etc. Diagnosed with poss Lyme and Dementia

I call repeatedly about my extreme bills. Reps state only time that increase is seen is if a neighbor is stealing power from you. May 2016 A rep(Jennifer) comes and reluctantly tested the meter. After stating she never had a defective meter, she states with shock that my meter tested as defective. She stated she had no extra meter with her.

I never receive a new meter or explanation. I call DTE repeatedly and told there is no record of anyone from DTE out to test the meter.

September 2016 I send notarized letter by certified mail giving DTE 7 days to correct the meter or I will have my analog meter installed. Never hear from DTE and proceed to analog meter.

November 2017 – I call and at my inquiry and request DTE opens a billing investigation and told I will be contacted by phone.

December 21 2016- my 12 year old son wakes up with a swollen uvula and has extreme difficulty breathing and can't talk. After calling doctor I go to leave with my three children to get son medical help, I find DTE arriving in my 400' driveway with a van and truck blocking me from being able to leave. For an hour from 10am-11am the **DTE workers refuse after repeated pleas from me , for them to move the truck** due to my sons medical emergency. A third truck arrives and they only move the trucks when completed with shutting off my power. (I have never missed a bill and have actually overpaid).

My 12 year old son is so severe he is admitted into st john pediatric floor by 12 (noon)....within an hour of leaving my home.

I spent 3 days trying to get power back on for Christmas weekend and for my sick son to come home to heat after two days in the hospital. Only by having a friend at DTE with connections help us did the power get turned on. my sick son and other kids had to stay at relatives and friends for the holiday weekend.

Thursday 12-22-2017 a rep (same jenny that did testing in may) came out to install a new meter. When reminded of the defective meter she advised it was programmed with the wrong rate code (for industrial) and was surprised I never received written notice from DTE and that my meter and bill was never fixed.

I'm still paying double the bill I used to pay in 2015. Also the reps advised that I have had to pay the opt out fees despite the fact that they aren't even capable of reading my meter wirelessly yet.

I have contacted the attorney general office as well as the public service commission regarding our being blocked from receiving medical help during an emergency (it is a law that shut off must cease during an emergency).....received no help.

I demand help and attention to this medical emergency situation and I will have my right to an analog meter.

Brian Carten
Former Police officer and Firefighter
810-305-3534-call anytime

Jeanine Susan Deal

3508 Capital Ave SW ~ Battle Creek, MI 49015 ~ (269) 965-0461 ~ j.s.deal@att.net

February 20, 2017

Re: Testimony to the Energy Policy Committee

In 2013, about 6 months after getting my very first cell phone, I had to stop putting the phone to my ear because of burning pain I felt when I did. The pain went away, but returned without cell phone use about two years later.

In November of 2014, our natural gas company, SEMCO Energy, wanted to upgrade our two gas meters, even though the old meters were working fine. The installers told us the meters only transmit once per month to collect the meter read, so we allowed the installation.

About 6 months later, the pain returned to my "phone ear" without cell phone use, which was confusing to me at first. Then I remember the new gas meters.

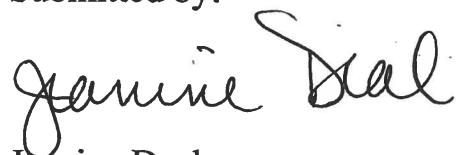
I contacted SEMCO Energy, and Dave Williams, the Regional Operations Manager, sent me specifications on their new gas meters. It turns out they send signals over 450,000 times per month, not just once. They pulse an average of 10 times per minute, non-stop. And per Dave Williams, they ARE "stronger" than their old meters. No wonder my phone ear started hurting again.

We asked SEMCO to remove their new meters, and replace them with non-transmitting meters. They said they could NOT do that. The only thing they COULD do was completely shut-off our natural gas service, and then remove their new meters.

So I contacted the Michigan Public Service Commission, the Attorney General's office, and the Better Business Bureau. None were able to help me.

This is why I am asking you to support House Bill 4220, that will allow public utility customers the choice between analog public utility meters, and non-analog.

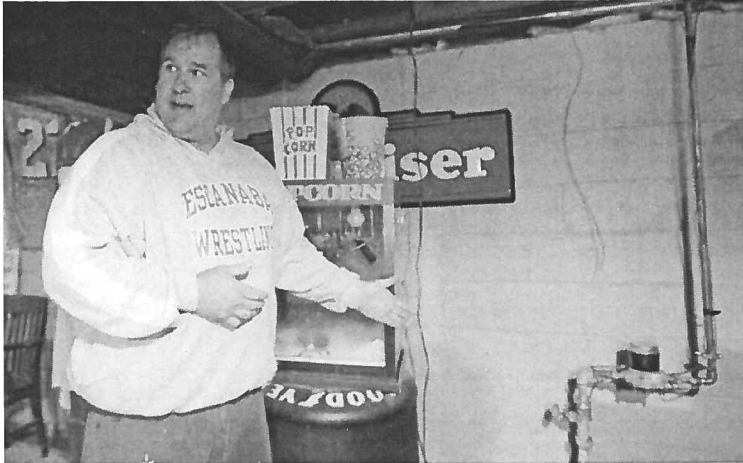
Submitted by:



Jeanine Deal

Michigan

Bay City smart meter rollout leaves residents with plumbing bills, concerns and questions



Mark Niernberg points out the water meter at his Bay City home Thursday, July 10. Niernberg opted to not sign a waiver to have a third-party vendor replace his water meter, fearing that his water system might break. Bay City contracted Utility Partners of America to replace about 35,000 water meters across the city with new, "smart meters." If a meter needs to be completely replaced, the company is having residents sign a waiver saying the company isn't responsible for any damages. (Yfat Yossifor | The Bay City Times)



By Andrew Dodson | adodson@mlive.com

[Email the author](#) | [Follow on Twitter](#)

on July 14, 2014 at 7:15 AM, updated September 09, 2014 at 5:30 PM

BAY CITY, MI — Bay City officials say the switch to electronic "smart meters" for the city's electric and water utilities makes operations more efficient and provides more usage transparency to residents.

But as the \$6.8 million program continues to roll out, it has caused headaches and expensive plumbing bills for some residents.

Terry Basmadjian, who lives on Bay City's West Side, said she paid \$160 to have a plumber replace a valve that broke when her meter was swapped out last week. Mark Niernberg, fearing he would have to pay a similar, or higher, bill, opted against switching his meter out for now, as the installer requires residents to sign a waiver saying the company isn't liable for any damages during the install.

"I'm all for the new meters, but if they switch this out, I'll likely have to hire a plumber to fix it," Niernberg said. "If I have a plumber come out and update my water lines, and then the city comes in to install the meter, and something breaks, I would need to pay to have a plumber come out again and fix it. I think this whole notion that the homeowner is responsible is ridiculous."

City officials are now looking into these issues to ensure the estimated 15,000 water meters can be installed by year's end without costing customers hundreds of dollars.

"As of now, I've only heard of one formal complaint," said Bay City Manager Rick Finn. "But I've been told there are some concerns about the process. We need to look into this more before we make any decisions on if we need to make some changes."

Problems with the install

When Terry Basmadjian signed the waiver, she didn't realize it included a sentence that said she would be liable for any damages that could occur during the installation process.

"I just thought they needed my permission to start the work," she said. Basmadjian is the step-mother to Bay City Commissioner Kerice Basmadjian, 7th Ward.

Terry Basmadjian realized the water valve was broken when the installer tried to turn water back on after swapping the meter. It was likely the first time the valve had been turned off since moving into the residence, she said.

"The installer then told me his company isn't responsible because I signed the waiver," Basmadjian said.

After a \$160 visit from Bay City-based Doug's Plumbing, her valve was replaced.

Bob Dion, the city's water distribution metering supervisor, said the city has received about a dozen calls per day from residents who experienced a broken valve as a result of the smart meter install.

"These are old houses, and many of them haven't exercised their valves ever," he said. "They've never been turned off, which is why they break easily."

As a result, a resident ends up hiring a plumber that can cost up to hundreds of dollars.

Doug Trerice, owner of Doug's Plumbing, said his company has replaced about 100 valves since the water meter swaps started.

Trerice said older valves are made of brass, which is more susceptible to rust than modern valves, which are made of a stronger type of alloy with Kaplan coating.

"We've definitely been busy during this switch," he said.

Trerice recommends residents exercise their valves at least once per year.

"When you turn them off, though, do it slowly," he said. "When you turn it back on, also do it very slowly."

Upcoming solution?

Terry Kilburn, the city's water and sewer supervisor, said some residents have paid "several" hundreds of dollars to plumbers to have their valves repaired, as a result of the smart meter rollout, prompting the city to act swiftly and find a solution.

He says the city is looking into creating a program that would give residents a list of local plumbers to replace the valves. Under the proposed plan, plumbers would submit a bid for the cost of a valve replacement, Kilburn said, and become an approved vendor of the city.

"Residents would be more comfortable if we can say, here's a plumber and here's how much it's going to cost, instead of telling them to just call a plumber," Kilburn said.

The resident would still pay for the valve replacement, Kilburn said.

"This is something that's at the top of the list to act on," he said. "It's very important."

Any program or ordinance change would require the approval of the Bay City Commission.

Smart meter history and process

The Bay City commission **approved the upgrade to the smart meter system in October 2012**. The move means fewer visits from meter readers and more details to consumers about their usage.

Using a radio transmitter, the meters send information daily about homeowners' electrical and water consumption to small towers placed around the city, which bounce the data to city servers.

The system can alert city utility officials earlier than the existing system of irregular usage, such as a major leak underground that could cost residents big dollars.

"If someone is out of town and their pipes burst, we'll receive an alert that shows a spike in usage, allowing us to respond and turn off the water before it becomes a big problem," said Dion. "If that happened today, we'd rely on residents calling us saying that there's water coming out of the basement windows of their neighbor's house."

The \$6.8 million upgrade was paid for using money from a 2008 bond sale and electric and water rates, said George Martini, the city's fiscal services director. The bonds are expected to be paid off by the end of next year.

The Bay City Commission **recently approved** a rate increase of \$3 to the customer service charge and 11-cents on the usage unit of 100 cubic feet of water.

There are four city employees swapping out meters for businesses and industrial properties, but most residents will see a Utility Partners of America truck parked outside their home. UPA, based in Greenville, S.C., was hired based on recommendation from Badger Meter, the Wisconsin-based company that manufactures the smart meters. Dion said city employees couldn't handle the sheer volume of replacing all water meters, prompting the city to hire a third-party.

Electric meter swaps started in February and are more than 80 percent complete. Water meter swaps, which started in April, are about 20 percent complete.

"We're a little behind, but still think we can finish up the work by the end of the year," said Dion.

Once electric meters are swapped, those workers will transition to water meters, said Dion.

Representatives from an out-of-state call center are calling residents to schedule one-hour appointment windows to install the new meter and radio transmitter. Houses with updated meters only require the installation of the handheld-sized transmitter, which takes about 20 minutes. Installation of a new meter can take up to an hour and requires turning water off in the household for about a half hour, said Dion.

"The biggest hold up is trying to get people at their houses when an installer can be there," Dion said. "We need an adult at the house in order to do the install."

Job concerns

Despite some of the benefits of smart meters, some residents are questioning why the city needs them.

"Do we really need them?" asked Bob Philip, who had his meter recently replaced. "That — and how many jobs are they eliminating? The city doesn't need more job loss."

According to Finn, the city will eliminate four of its five meter reader positions, beginning next fiscal year, which starts July 1, 2015.

All five meter readers are budgeted to stay on the payroll for the current fiscal year, which started July 1. Once the entire system is online, the positions would be phased out if an employee opted to leave during the current fiscal year, said Martini.

It costs about \$85,500 per meter reader with salary and fringe benefits, said Martini. Meter readers, who check water and electric meters, earn between \$17.35 to \$18.98 per hour and receive medical benefits from the city.

The city will keep one meter reader on to deal with any glitches with the new smart meter system, said Finn. Savings from the four eliminated positions work out to about \$342,000 for next fiscal year.

Martini said the city would work to find other positions in the water or electric departments for impacted employees.

Other concerns

It's not just broken water valves that are rubbing residents the wrong way during the transition to smart meters.

Ray Armstrong said his meter has made a loud clicking noise, but city officials have told him it would be replaced.

Others say they're concerned about possible health issues due to the transmitter that sends off usage data to the city's servers.

"I've had residents call me saying the transmitters are a real concern for them," said Commissioner Elizabeth Peters, 2nd Ward.

Kim Haken, manager of Columbus Laundromat, which recently had to pay a \$15,000 water bill after the city installed an incorrect meter reader and an ongoing clerical error, said city officials told her a new meter could increase her water bill.

Kilburn said that could be the case, but the new meter could also work in favor of the customer.

"If their meter was running slow before, it would benefit the city," he said. "But if it was running fast, it would benefit the customer."

Bay City Commission President Lori Dufresne, 4th Ward, said she has had a resident complain about the meter being too loud and others about the waiver process as part of installation.

"I guess it's one of those things that we need more discussion on in order to smooth it out and make it feel easier for the residents," she said.

Personally, Dufresne, who works in Midland, said it was difficult for her to schedule a time to coordinate with a scheduler to install the meter.

"It's a challenge to find a convenient time," she said.

Several residents interviewed acknowledged the professionalism of the installers from UPA.

"We had a younger kid come to the house and he was very open with me," Nierenberg said. "When I told him I wasn't going to sign the waiver because I didn't want to deal with a broken valve, he even agreed with me and told me that I should get a plumber to look at it first."

Finn said opting out of the smart meter program won't be encouraged, but it is possible. Residents who decide against the new technology, however, would have to pay hefty fees for a meter reader to come to their residence each month.

"When we show the cost of a monthly reading to a resident, it becomes obvious pretty quickly that it's not in their best fiscal interest," he said.

February 21, 2017

Ladies and Gentlemen:

I support the draft you prepared. The fact that the Federal government paid DTE 89 million dollars for smart meter installation, makes the project a little suspect. Here are my suggestions:

First: On page 2, lines 16 and 17. Replace text with

... UNLESS THE CUSTOMER HAS REQUESTED THE
INSTALLATION OR CHANGE.

The present wording leans strongly toward the utility and assumes the change ("upgrade") is a good one. I disagree. I believe the change is harmful.

Second: On page 6, delete lines 4 through 12.

A UTILITY MAY REPORT DATA RELATING TO ELECTRIC OR
COMPRESSED NATURAL GAS VEHICLE FUELING TO THE
DEPARTMENT OF TREASURY.
THE DEPARTMENT OF TREASURY SHALL USE THAT
INFORMATION STRICTLY FOR TAXATION PURPOSES AND
SHALL NOT SHARE THAT INFORMATION WITH LAW
ENFORCEMENT WITHOUT A WARRANT, AND THAT
INFORMATION IS NOT SUBJECT TO DISCLOSURE UNDER
THE FREEDOM OF INFORMATION ACT, 1976 PA 442, MCL
15.231 TO 15.246, EXCEPT FOR AGGREGATE DATA USED
FOR RESEARCH PURPOSES IN A NONIDENTIFYING MANNER.

I object to that language for 2 reasons.

First, because I am already paying tax for the electricity. Now you want to consider how the electricity is being used, in order to charge more tax (?), I don't want you to do that. It clouds the issue. If you want to tax the fuel used in my lawnmower, deal with it separately.

If I buy an electric vehicle, I want to charge it with my water based generator. None of that relates at all to the utility or taxation.

Thank you.,

Robert

Robert L Phillips
Robert@rlpeba.com

Greetings:

Unfortunately, we couldn't be present today but felt compelled to comment on H.B. 4220. As members of the "**REPUBLIC**" we certainly understand how our system of government works. In our "**REPUBLIC**" no one can be forced to do anything against their will. After careful examination of the so-called smart meter we've decided that such a device is more of a liability than an asset. For this, we stand in **OPPOSITION** to the implementation of so-called smart meters and in support of H.B. 4220. This bill is very important and we, as well as many others, won't rest until it's passed and signed into law.

In Liberty,
Gregg Bazzani



Scott Bazzani



14590 Mulberry
Southgate, MI 48195

**Before the Michigan House Energy Committee
Hearing on HB 4220 - Meter Choice Bill**

December 21, 2017

**Exhibit to accompany testimony of
David Sheldon***

Testifying For the Bill

The exhibit consists of excerpts from a report of a federal government task force charged with examining the privacy implications of smart meters and smart grid.

*** David Sheldon holds an MBA, B.A. in physics and economics, is certified in software engineering and has 20 years experience in software development prior to his retirement.**

Guidelines for Smart Grid Cyber Security: Vol. 2, Privacy and the Smart Grid

The Smart Grid Interoperability Panel–Cyber Security Working Group

August 2010

What follows are excerpts from NISTIR 7628, a report of the National Institute of Science and Technology, U.S. Dept of Commerce. The complete report may be found here: https://www.nist.gov/sites/default/files/documents/smartgrid/nistir-7628_total.pdf

5.1 WHAT IS PRIVACY?

There is no one universal, internationally accepted definition of “privacy,” it can mean many things to different individuals. At its most basic, privacy can be seen as the right to be left alone.⁴ Privacy is not a plainly delineated concept and is not simply the specifications provided within laws and regulations. Furthermore, privacy should not be confused, as it often is, with being the same as confidentiality; and personal information⁵ is not the same as confidential information.

Confidential information⁶ is information for which access should be limited to only those with a business need to know and that could result in compromise to a system, data, application, or other business function if inappropriately shared.⁷

It is important to understand that privacy considerations with respect to the Smart Grid include examining the rights, values, and interests of *individuals*; it involves the related characteristics, descriptive information and labels, activities, and opinions of individuals, to name just a few applicable considerations.

For example, some have described privacy as consisting of four dimensions:

1. **Privacy of personal information.** This is the most commonly thought-of dimension. Personal information is any information relating to an individual, who can be identified, directly or indirectly, by that information and in particular by reference to an identification number or to one or more factors specific to his or her physical, physiological, mental, economic, cultural, locational or social identity. Privacy of personal information involves the right to control when, where, how, to whom, and to what extent an individual shares their own personal information, as well as the

right to access personal information given to others, to correct it, and to ensure it is safeguarded and disposed of appropriately.

2. **Privacy of the person.** This is the right to control the integrity of one's own body. It covers such things as physical requirements, health problems, and required medical devices.
3. **Privacy of personal behavior.** This is the right of individuals to keep any knowledge of their activities, and their choices, from being shared with others.
4. **Privacy of personal communications.** This is the right to communicate without undue surveillance, monitoring, or censorship.

Most Smart Grid entities directly address the first dimension, because most data protection laws and regulations cover privacy of personal information. However, the other three dimensions are important privacy considerations as well; thus dimensions 2, 3, and 4 should also be considered in the Smart Grid context because new types of energy use data can be created and communicated. For instance, we can recognize unique electric signatures for consumer electronics and appliances and develop detailed, time-stamped activity reports within personal dwellings. Charging station information can detail whereabouts of an EV. This data did not exist before the application of Smart Grid technologies.

5.3.5 General Invasion of Privacy Concerns with Smart Grid Data

Two aspects of the Smart Grid may raise new legal privacy issues. First, the Smart Grid significantly expands the amount of data available in more granular form as related to the nature and frequency of energy consumption and creation, thereby opening up more opportunities for general invasion of privacy. Suddenly a much more detailed picture can be obtained about activities within a given dwelling, building, or other property, and the time patterns associated with those activities make it possible to detect the presence of specific types of energy consumption or generation equipment. Granular energy data may even indicate the number of individuals in a dwelling unit, which could also reveal when the dwelling is empty or is occupied by more people than usual. The public sharing of information about a specific location's energy use is also a distinct possibility. For example, a homeowner rigged his washing machine to announce the completion of its cycle via his social networking page so that the machine need not be monitored directly.¹⁷ This raises the concern that persons other than those living within the dwelling but having access to energy data could likewise automate public sharing of private events without the dwellers' consent—a general invasion of privacy.

The concern exists that the prevalence of granular energy data could lead to actions on the part of law enforcement —possibly unlawful in themselves—and lead to an invasion of privacy, such as remote surveillance or inference of individual behavior within dwellings, that could be potentially harmful to the dwelling's residents. Law enforcement agencies have already used monthly electricity consumption data in criminal investigations. For example, in *Kyllo v. United States*,¹⁸ the government relied on monthly electrical utility records to develop its case against a suspected marijuana grower.¹⁹ Government agents issued a subpoena to the suspect's utility to obtain energy usage records and then used a utility-prepared "guide for

estimating appropriate power usage relative to square footage, type of heating and accessories, and the number of people who occupy the residence” to show that the suspect’s power usage was “excessive” and thus “consistent with” a marijuana-growing operation.

As Smart Grid technologies collect more detailed data about households, one concern identified by the privacy group as well as expressed by multiple published comments is that law enforcement officials may become more interested in accessing that data for investigations or to develop cases. For instance, agencies may want to establish or confirm presence at an address at a certain critical time or even establish certain activities within the home —information that may be readily gleaned from Smart Grid data.

However, the Supreme Court in *Kyllo* clearly reaffirmed the heightened Fourth Amendment privacy interest in the home and noted this interest is not outweighed by technology that allows government agents to “see” into the suspect’s home without actually entering the premises.²¹ The Court stated, “We think that obtaining by sense-enhancing technology any information regarding the interior of the home that could not otherwise have been obtained without physical intrusion into a constitutionally protected area, constitutes a search” and is “presumptively unreasonable without a warrant . . .

Second, unlike the traditional energy grid, the Smart Grid may be viewed as carrying private and/or confidential electronic communications between utilities and end-users, possibly between utilities and third parties²³, and between end-users and third parties. Current law both protects private electronic communications and permits government access to real-time and stored communications, as well as communications transactional records, using a variety of legal processes.²⁴ Moreover, under the Communications Assistance for Law Enforcement Act (CALEA), telecommunications carriers and equipment manufacturers are required to design their systems to enable lawful access to communications.²⁵ The granular Smart Grid data may also have parallels to call detail records collected by telecommunications providers. It is unclear if laws that regulate government access to communications will also apply to the Smart Grid.

In short, the innovative technologies of the Smart Grid pose new legal issues for privacy of the home, as well as any type of property location that has traditionally received strong Fourth Amendment protection. As Justice Scalia wrote in *Kyllo*: “The question we confront today is what limits there are upon this power of technology to shrink the realm of guaranteed privacy.”

5.3.6 Smart Grid Introduces a New Privacy Dimension

The ability to access, analyze, and respond to much more precise and detailed data from all levels of the electric grid is critical to the major benefits of the Smart Grid—and it is also a significant concern from a privacy viewpoint, especially when this data and data extrapolations are associated with individual consumers or locations. Some articles in the public media have raised serious concerns²⁷ about the type and amount of billing, usage, appliance, and other related information flowing throughout the various components of the Smart Grid.

There are also concerns across multiple industries about data aggregation of “anonymized” data.²⁸ For example, in other situations, associating pieces of anonymized data with other publicly available non-anonymous data sets has been shown by various studies to actually reveal specific individuals.²⁹ Figure 5-1 illustrates how frequent meter readings may provide a detailed timeline of activities occurring inside a metered location and could also lead to knowledge about specific equipment usage or other internal home/business processes.

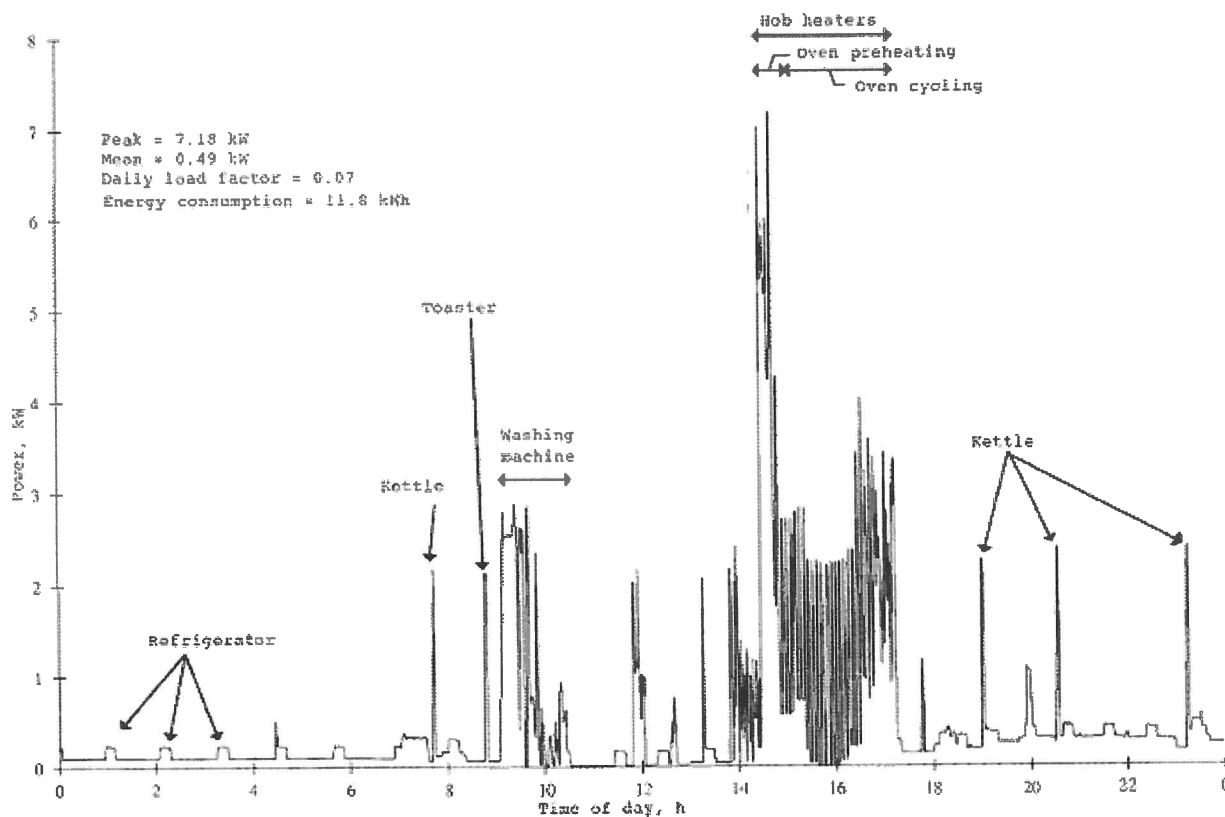


Figure 5-1 Power Usage to Personal Activity Mapping

Smart meter data raises potential surveillance possibilities posing physical, financial, and reputational risks. Because smart meters collect energy usage data at much shorter time intervals than in the past (in 15-minute or sub-15-minute intervals rather than once a month), the information they collect can reveal much more detailed information about the activities within a dwelling or other premises than was available in the past. This is because smart meter data provides information about the usage patterns for individual appliances—which in turn can reveal detailed information about activities within a premise through the use of nonintrusive appliance load monitoring (NALM) techniques.³¹ Using NALM, appliances’ energy usage profiles can be compared to libraries of known patterns and matched to identify individual appliances.³² For example, research shows that analyzing 15-minute interval aggregate household energy consumption data can by itself pinpoint the use of most major home appliances.^{33, 34} The graph shown above (Figure 5-1) depicts NALM results as applied to a household’s energy use over a 24-hour period. NALM techniques have many beneficial uses,

including pinpointing loads for purposes of load balancing or increasing energy efficiency.

However, such detailed information about appliance use can also reveal whether a building is occupied or vacant, show residency patterns over time, and reflect intimate details of people's lives and their habits and preferences inside their homes.³⁵ In 1989, George W. Hart, one of the inventors of NALM, explained the surveillance potential of the technique in an article in IEEE Technology and Society Magazine.³⁶ As the time intervals between smart meter data collection points decreases, appliance use will be inferable from overall utility usage data and other Smart Grid data with even greater accuracy.

In general, more data, and more detailed data, may be collected, generated, and aggregated through Smart Grid operations than previously collected through monthly meter readings and distribution grid operations. Figure 5-2 presents the NIST conceptual model illustrating how data collection can be expected to proliferate as networked grid components increase. In addition to utilities, new entities may also seek to collect, access, and use smart meter data (e.g., vendors creating applications and services specifically for smart appliances, smart meters, and other building-based solutions). Further, once uniquely identifiable "smart" appliances are in use, they will communicate even more specific information directly to utilities, consumers, and other entities, thus adding to the detailed picture of activity within a premise that NALM can provide.

There are at least two good (for the smart meter mfr) reasons why the spark gaps were eliminated. First, is pragmatic in that a plasma discharge in the immediate proximity of sensitive electronic equipment can either damage such or make it lose its memory (both data and or program). A plasma discharge (spark) generates high power electromagnetic noise over a wide frequency spectrum and often causes unpredictable interference. I know and understand such because I am a retired electronic power controls engineer and have struggled with this issue for my entire career.

The second involves agency approvals. While a spark gap can be approved, the typical spark gap found in legacy meters are of an empirical design that simply works, but avoids classic spark gap design rules—an approved spark gap would take hundreds of thousands of dollars to get tested and approved by UL or other independent testing house, and would not fit in the footprint of the existing meter. Although the empirical spark gap design may be somewhat deficient in energy handling capacity, the synergistic effect of thousands of grid-connected spark gaps (all legacy meters) can not be underestimated—they simply have been proven to be very effective.

The bottom line is that the consumer is left holding the bag when it comes to lighting or surge damage to structures and appliances—neither the manufacture nor the utility accepts responsibility.....and certainly not the ~~PUC~~ that was originally established to protect the consumer.

MASC Section 460.62

The obvious solution is to bring back the legacy meter!

ii. Fourth Amendment Jurisprudence

Other authors—most notably Jack Lerner and Deirdre Mulligan—have dealt squarely with Fourth Amendment concerns related to advanced metering infrastructure and high-resolution energy usage information.⁹² The lessons of their investigation should, however, be kept in mind—namely, that interval data of electricity consumption appears to be in something of a no-man’s-land under Supreme Court Fourth Amendment jurisprudence. On the one hand, the Court has upheld the sanctity of the home as the touchstone for privacy protection.⁹³ Technology that effectively pierces the blinds, exposing information about activities inside the home requires a warrant before it is employed. It would appear that electricity usage data, as it contains many intimate details about the in-home activities of consumers, allows investigators to see through walls into the home and so access to the information should be restricted to essentially a need-to-know basis.⁹⁴

On the other hand, business records collected and kept by third parties enjoy far fewer privacy protections, the underlying theory being that consumers elected to transact with the business, and to engage in activities open to observation by the public.⁹⁵ Traditional electricity metering information has generally been treated as business records and so lies unprotected by the Fourth Amendment.⁹⁶ Though Lerner and Mulligan seem optimistic that courts will “take the long view” on Fourth Amendment protections and extend them to smart metering data, my own analysis is that the law as it stands does not decide the matter, and the jurisprudence could easily be used to justify either result.

⁹² The instant discussion is meant merely to bring out some of the issues and not provide a comprehensive treatment of these concerns. For a more comprehensive treatment, see Jack I. Lerner & Deirdre K. Mulligan, *Taking the “Long View” on the Fourth Amendment: Stored Records and the Sanctity of the Home*, 2008 STAN. TECH. L. REV. ¶¶ 7–8, 11–30, available at <http://stlr.stanford.edu/pdf/lerner-mulligan-long-view.pdf>.

⁹³ See *id.* ¶¶ 14, 18 (discussing *Kyllo v. United States*, 533 U.S. 27, 37–40 (2001), a case in which the Supreme Court ruled law enforcement’s use of thermal imaging without a warrant to spot areas of relative heat within a residence, areas later discovered to be used for growing marijuana).

DTE shuts off power to 92-year-old woman's home because of battle over smart meter

POSTED: 10:53 PM, Sep 17, 2015

UPDATED: 10:25 AM, Sep 18, 2015

Share Article

LINCOLN PARK, Mich. (WXYZ) - An elderly Lincoln Park woman is involved in a showdown with DTE over the meter at her house.

The utility company shut off Olga Puste's power the day after her 92nd birthday, because she installed a lock on her meter. DTE wants to install a smart meter, which Puste says is against her beliefs.

Puste is a long time naturopath and avoids things like conventional medicine and vaccines.

While she does have the option to pay \$10 a month to opt out of a smart meter, DTE would still install a digital meter on her home. Digital meters are also against her beliefs as a naturopath.

DTE says they warned Puste four times before shutting off the power. They released the following statement about the situation:

With the device still in place today, after multiple notifications, DTE had to act in the best interest of the customer and the community by turning off her power. DTE's action were taken to ensure the safety of all its customers and their communities, especially those who may have unknowingly made decisions that pose a danger to themselves and their neighbors.

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BACKGROUND:

I hold an electrical engineering and mechanical engineering degree and previously was employed through late 2015 for 8 years at the Emerson Electric Company. While at Emerson Electric I was the Senior Program Manager for Power Distribution Systems and in charge of an RF and IP based digitally controlled high power AC power switching system product line in use in over 100 countries and I was also directly responsible for product certifications such as UL, CE, PSE and many other countries electrical certification bodies. I am very familiar with the electrical and electronic design of the AMI meters in use because I was responsible for very similar products with over 1 Million units installed across the world. I have done this analysis due to my own curiosity without conflict of interest of this new technology.

I have 40 Years work experience in design and deployment of:

- High tech power management systems, UPS and power distribution
- Switched Mode Power Supplies
- Electrical and Electronic hardware engineering
- Computer systems engineering
- Radio Systems design and testing
- High Current and High Voltage switches
- Internet communications using both wired and wireless technologies
- UL, CE (Europe), Africa, Japan, Australia and China product safety certifications
- Cyber encryption and protection of Radio Communications using digital signals
- RFI/EMI mitigation

Relative to comments to the following 3 questions:

First a couple of clarifications are in order - the AMI radiating meter and the non-radiating meter are identical in all respects. They have the same components, boards, housing etc. The Opt-Out meter is the same as the non-Opt-Out meter in all respects, the Opt Out Meter is configured with the radios turned off or "deactivated".

The AMI meters have two radio transceivers; one operates in the same frequency of a cell phone or microwave oven of ~900 MHz, which is for a link to the utility and the second radio operates in the same frequency as a wireless home router or a PC at ~2.4 GHz. The 900 MHz radio transmits between .6 to 1.0 watts depending on the installed surrounding conditions, such as reflective surfaces nearby like bouncing off a neighbors home walls. The ~2.4 GHz is called a Home Area Network (HAN) that operates at .25 to .40 watts depending on the surrounding surfaces. The HAN is intended to permit connection of the AMI meter to the home internet devices such as Wi-Fi thermostats and Wi-Fi enabled home appliances.

1. Question: If a "deactivated" meter can be turned on remotely

Answer: By deactivated I believe you are referring to the two Transceivers (a transceiver is both a transmitter and a receiver) within the ITRON AMI Meter. Only the transmit function is turned off, but the receive function is not ever turned off. To accomplish this the source of power for these two circuit chips would have to be cut off. If this was done to the meter it would no longer function at all because the CPU (Central Processing Unit-Brain for circuit board) for all the functions of the meter are on the same circuit board as the radio circuits. So the answer is yes.

It is important to understand the receive function is always on and can receive a command to re-enable the transmit function on both radios anytime by the utility without sending out a tech on site. The radios from one meter talks to a neighboring meter which then talks to another neighboring meter, by sending the waves through all homes in the neighborhood. This is very dangerous to people who are sensitive to radio frequencies (RF). The utility can use this network connection to re-active the meter. This can all be done without the customer being aware of it.

Proof of this capability is demonstrable when a home that has the Opt-Out AMI meter installed is transferred to a new owner/occupant, suddenly the Opt-Out meter becomes a regular radiating meter without a tech from the utility going to the home. A conventional analog mechanical meter does not have the ability to broadcast.

2. Question: If a "deactivated" meter is still broadcasting

This is not a question that allows for a simple yes or no answer. The utilities can send a signal 24/7 to any deactivated meter and the meter will broadcast back to the utility any information they request.

3. Question - Any other reasons a deactivated meter is bad (with proof)

Answer: Both AMI meters inject a pair of interfering voltages overlaid on to the standard 60Hz (in Light blue)

This interference is called Radio Frequency Interference and Electromagnetic Interference called RFI and EMI. This RFI/EMI is the result of a defective design of the Switched Mode Power Supply in the AMI meters which is used to power the electronics. This power supply is used to convert the 240 Volts AC to the various DC voltages required.

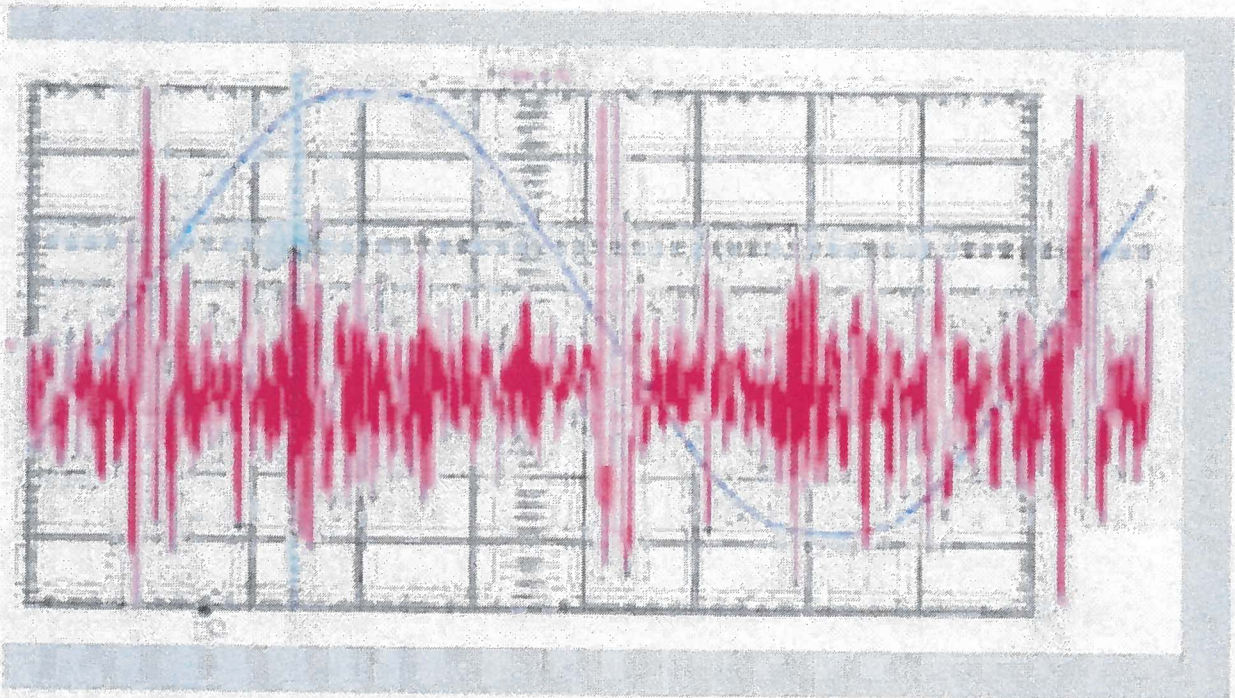
In my past responsibility in Electrical and Electronic designs this DTE/CeCO meter would not be acceptable for deployment. This series of interfering voltages creates what is commonly called "Dirty Electricity". The interference displayed also indicates that there is an out of control interference because the oscilloscope indicates there is no defined pattern to the interference. Besides the effects on health it also degrades the performance of home appliances leading to appliance damage such as furnaces, washers and dryers, refrigerators. These appliances have not been designed to operate in such an environment.

Once the RFI/EMI gets injected on to the home wires it become very expensive to mitigate the oscillations after it gets injected.

Noted epidemiologist Dr. Samuel Milham connects dirty electricity with heart disease, cancer, diabetes, and neurological disorders like ALS and suicide.

• <http://www.electricsense.com/5229/dirty-electricity-electrification-and-the-diseases-of-civilization/>

This waveform displayed is the same as an oscilloscope trace would look like, you cannot see this on a common voltmeter. Now we have introduced the effects of EMI/RFI to the same wire carrying the house current. This effect can be better depending on the environment especially how good the house earth ground is magnetically coupling the house voltage currents. There are many variables that affect this waveform. The smooth curve light blue is the standard 60 Hz line voltage. The red signal is the RFI/EMI. This is common on every meter I have tested.



Respectfully submitted,

William S. Bathgate

William S. Bathgate

Module 8:

EMC Regulations

Introduction

The goal of electromagnetic compatibility, or EMC, is to design electronic systems that are electromagnetically compatible with their environment. EMC requirements exist so that electronic systems designers have a set of guidelines that explain the limits of what is considered electromagnetically compatible. There is not, however, one all-encompassing set of EMC guidelines. Instead, EMC guidelines are created by individual product manufacturers, and by the government. Requirements set forth by the government are legal requirements that products must meet, while the requirements set forth by the manufacturer are self-imposed and often more stringent than those set forth by the government.

Government Requirements

Not all countries have the same EMC requirements. In fact, each country is responsible to enforce their own set of requirements. This does not, however, mean that each country has a unique set of EMC requirements. In fact, the various EMC requirements set forth by all the countries of the world are very similar, and many countries are moving toward accepting an international standard for EMC requirements known as the CISPR 22 standards. These standards have been adopted throughout much of Europe and were developed in 1985 by CISPR (the French translation meaning International Special Committee on Radio Interference).

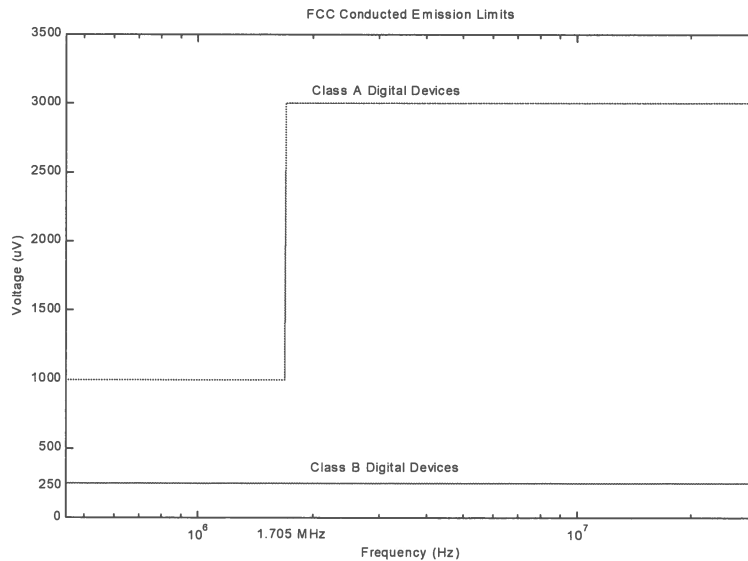
In the United States the Federal Communications Commission (FCC) is charged with the regulation of radio and wire communication. Radio frequency devices are the primary concern in EMC. A radio frequency device is defined by the FCC as any device that is capable of emitting radio frequency energy by radiation, conduction or other means whether intentionally or not. Radio frequencies are defined by the FCC to be the range of frequencies extending from 9 kHz to 3000 GHz. Some examples of radio frequency devices are digital computers whose clock signals generate radiated emissions, blenders that have dc motors where arcing at the brushes generates energy in this frequency range, and televisions that employ digital circuitry. In fact nearly all digital devices are considered radio frequency devices.

With the advent of computers and other digital devices becoming popular, the FCC realized that it was necessary to impose limits on the electromagnetic emissions of these devices in order to minimize the potential that they would interfere with radio and wire communications. As a result the FCC set limits on the radiated and conducted emissions of digital devices. Digital devices are defined by the FCC as any unintentional radiator (device or system) that generates and uses timing pulses at a rate in excess of 9000 pulses (cycles) per second and uses digital techniques... . All electronic devices with digital circuitry and a clock signal in excess of 9 kHz are covered under this rule, although there are a few exceptions.

The law makes it illegal to market digital devices that have not had their conducted and radiated emissions measured and verified to be within the limits set for by the FCC regulations. This means that digital devices that have not been measured to pass the requirements can not be sold, marketed, shipped, or even be offered for sale. Although the

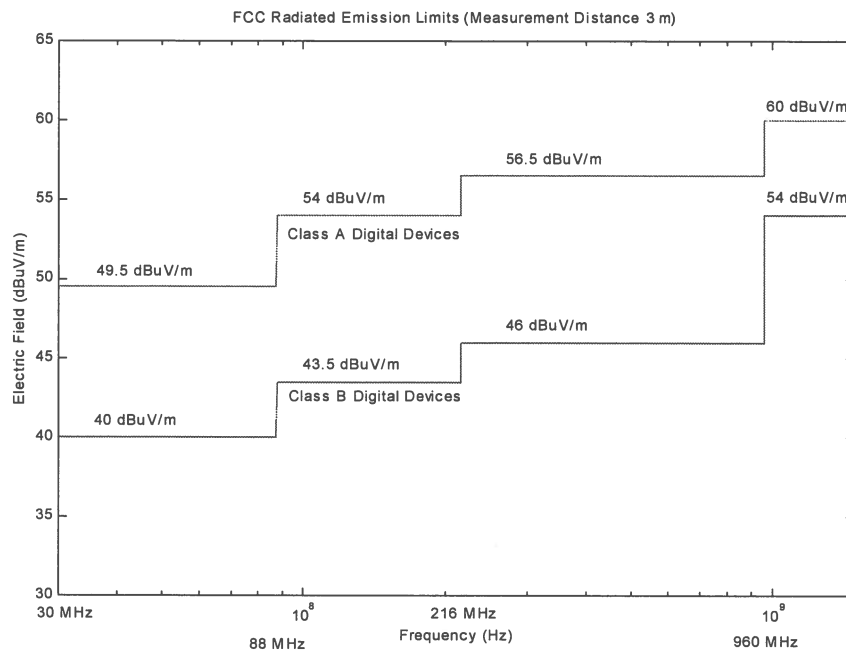
penalties for violating these regulations include fines and or jail time, companies are more concerned with the negative publicity that would ensue once it became known that they had marketed a product that fails to meet FCC regulations. Furthermore, if the product in question were already made available to the public, the company would be forced to recall the product. Thus it is important that every unit that a company produces is FCC compliant. Although the FCC does not test each and every module, they do perform random tests on products and if a single unit fails to comply, the entire product line can be recalled.

The FCC has different sets of regulations for different types of digital devices. Devices that are marketed for use in commercial, industrial or business environments are classified as Class A digital devices. Devices that are marketed for use in residential environments, notwithstanding their use in commercial, industrial, or business environments are classified as Class B digital devices. In general the regulations for Class B devices are more stringent than those for Class A devices. This is because in general digital devices are in closer proximity in residential environments, and the owners of the devices are less likely to have the abilities and or resources to correct potential problems. The following table shows a comparison of the Class A and Class B conducted emissions limits, where you can clearly see that the regulation for Class B devices are more strict than those for Class A devices. A comparison for radiated emissions will be shown later. Personal computers are a subcategory of Class B devices and are regulated more strictly than other digital devices. Computer manufacturers must test their devices and submit their test results to the FCC. No other digital devices require that test data be sent to the FCC, rather the manufacturer is expected to test their own devices to be sure they are electromagnetically compatible and the FCC will police the industry through testing of random product samples.



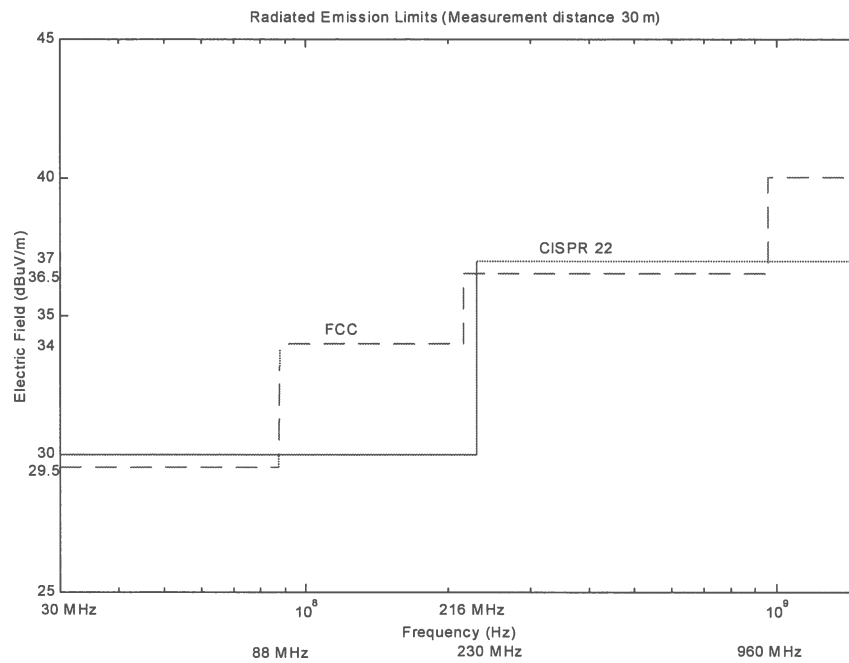
Since the FCC regulations are concerned with radiated and conducted emissions of digital products, it is useful to understand what these emissions are. Conducted emissions are the currents that are passed out through the unit's AC power cord and placed on the common power net. Conducted emissions are undesirable because once these currents are onto the building wiring they radiate very efficiently as the network of wires acts like a large antenna. The frequency range of conducted emissions extends from 450 kHz to 30 MHz. Devices are tested for compliance with conducted emissions regulations by inserting a line impedance stabilization network (LISN) into the unit's AC power cord. Current passes through the AC power line and into the LISN, which measures the interference current and outputs a voltage for measurement purposes. The actual FCC regulations set limits on these output voltages from the LISN even though the current is what is truly being regulated. Radiated emissions are the electric and magnetic fields radiated by the device that may be received by other devices, and cause interference in those devices. Although radiated emissions are both electric and magnetic fields, the FCC and other regulatory agencies only require that electric fields be measured for certification. The magnitudes of these fields are measured in dB μ V/m and the frequency range for radiated emissions extends from 30 MHz to 40 GHz. Radiated field measurements for FCC compliance are done in either a semianechoic chamber or at an open field test site. The product under test must be rotated so that the maximum radiation will be achieved and measurements must be made both with the measurement antenna in vertical and horizontal polarizations with respect to the ground plane.

The method for measuring radiated emissions varies depending on the type of device being measured. Class A digital devices must be measured at a distance of 10 m from the product and Class B devices are to be measured at a distance of 3 m from the product. As explained earlier, the Class B devices, which are marketed for residential use, have stricter regulations and thus must be measured in closer proximity than Class A devices. The following graph displays the radiated emission limits that are defined by the FCC for Class A and Class B digital devices. Because the measurement distances defined by the two requirements are different, we must scale the measurement distances so that they are both at the same distances in order to achieve an accurate comparison. One way to do this is with the inverse distance method, which assumes that emissions fall off linearly with increasing distance to the measurement antenna. Thus emissions at 3 m are assumed to be reduced by 3/10 if the antenna is moved out to a distance of 10 m. So, to translate Class A limits from a distance of 10 m to 3 m, we add $20\log_{10}(3/10) = 10.46$ dB to the Class A limits. This approximation is only valid, however, if the measurements are taken in the far field of the emitter. We can assume that the far field boundary is three wavelengths from the emitter, and with the radiated emissions frequency range defined as 30 MHz to 40 GHz, the maximum distance from the emitter that the measurements will be in the far field is 30 m. Thus, at 10 m not all measurements will be in the far field. At 10 m frequencies of 90 MHz and higher will be in the far zone. So, for the case of this plot, the inverse distance method can be assumed to be accurate for frequencies above 90 MHz, but begins to break down at lower frequencies. However, this comparison still nicely demonstrated how Class B limits tend to be roughly 10 dB more strict than Class A radiated emission requirements.

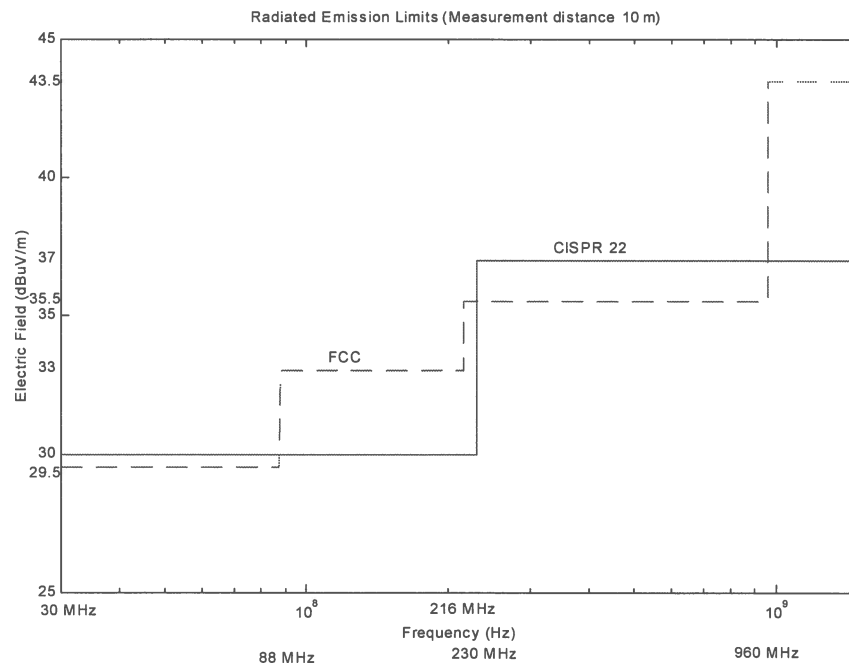


Internationally EMC requirements differ from those in the United States. As discussed earlier, each country is responsible for its own set of EMC regulations. Since the CISPR 22 regulations have been adopted by several countries we will examine them and compare them to the FCC regulations in the United States. CISPR 22 regulations require that radiated emissions measurements for Class A devices be measured at a distance of 30 m and Class B devices be measured at a distance of 10 m. Again using the inverse distance method, we can scale the measurement limits to a common distance and plot the CISPR 22 and FCC regulations together to compare them. As you can see, although the regulations vary slightly in different frequency ranges, there isn't much difference between the FCC and CISPR 22 regulations for radiated emissions.

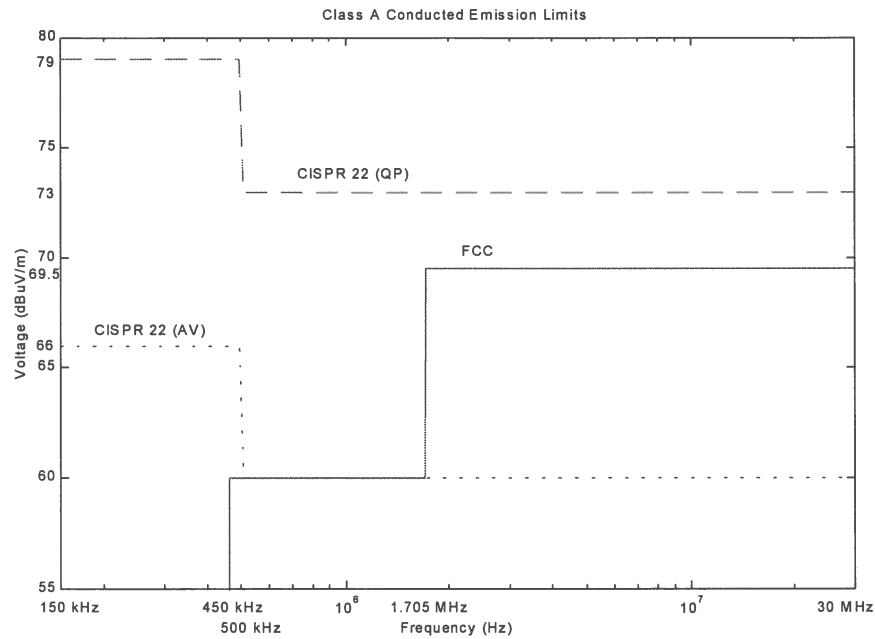
Radiated Emissions Limits for Class A Digital Devices

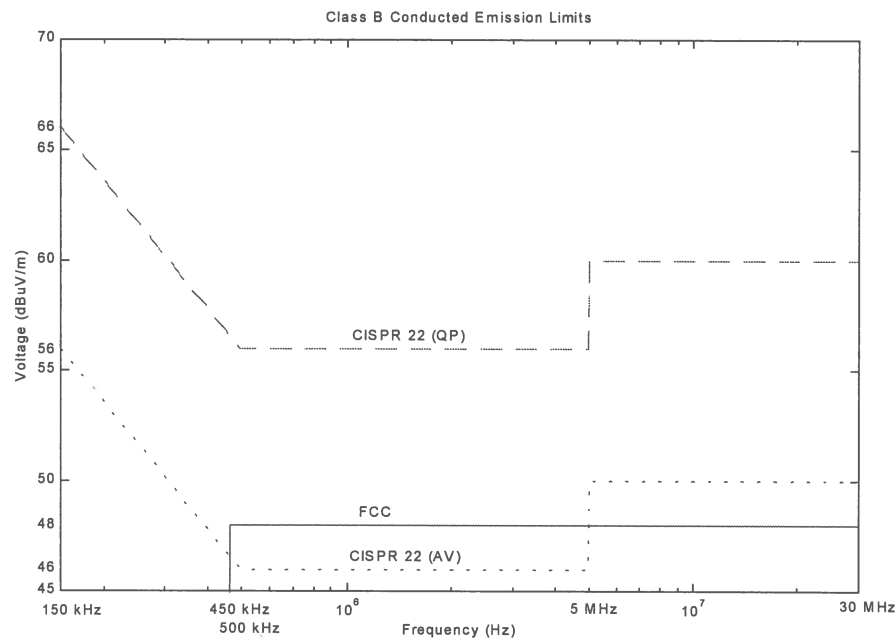


Radiated Emissions Limits for Class B Digital Devices



The differences in the FCC and CISPR 22 regulations become much more obvious when looking at the conducted emissions limits. The most notable difference is the frequency range that is regulated for conducted emissions. While they both have a maximum frequency of 30 MHz, the CISPR 22 regulations extend down to 150 kHz, while the FCC regulations only extend down to 450 kHz. You can see that the CISPR 22 limit for class B devices rises for frequencies below 500 kHz. This extension was put in place to cover the emissions of switching power supplies, which are growing in importance over linear power supplies due to their efficiency and light weight. Another difference is that the CISPR 22 regulations for conducted emissions are given for when the receiver uses a quasi-peak detector (QP) and when the receiver uses an average detector (AV). FCC conducted emissions limits and CISPR 22 and FCC conducted emissions limits all apply to the use of a quasi-peak detector.



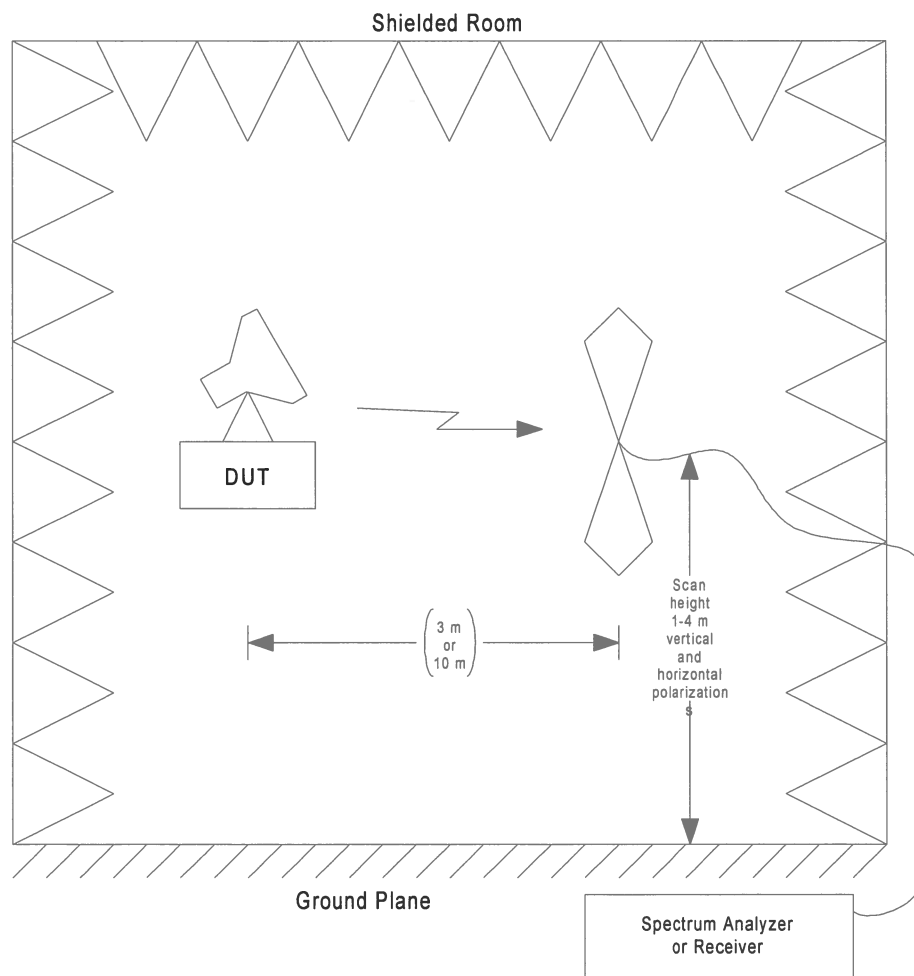


Military EMC regulations also exist. As you would expect, EMC issues are very important in military applications so that missions will not be compromised. Along with conducted and radiated emissions, the military also regulates susceptibility. This is very important in military applications, as it is vital that military equipment is immune to outside interference. The military is more strict in its regulations than the FCC or CISPR and it also has a much larger frequency range that is regulated and has several subdivisions within that frequency range. Additionally, the military may deem to have the EMC requirements waived for certain applications if it is judged that it is necessary to mission success. CISPR and FCC regulations cannot be waived for commercial products.

Measuring Radiated Emissions

In order to ensure that testing for radiated emissions are accurate, the FCC and CISPR have testing standards that explain how testing must be done. This ensures that the testing is accurate and repeatable. For radiated emissions the FCC specifies that the measurements of radiated and conducted emissions must be performed on the complete system. All interconnect cables to peripheral equipment must be connected and the system must be in a typical configuration. The cables and the system must also be configured in a representative way such that the emissions are maximized. For instance, a unit with interior wire harnesses must have the harnesses configured in such that for all possible ways the unit can be assembled with those wire harnesses, the way with the most radiated emissions must be tested. This ensures that for mass production of a unit, the worst case scenario is taken into consideration.

The testing standards set forth by the FCC for radiated emissions testing are very specific and difficult to automate. Radiated emissions are to be measured at a distance of 10 m for Class A devices and at a distance of 3 m for Class B devices. These measurements are to be made over a ground plane using a tuned dipole antenna at an open field test site. Additionally, the tests are to be made with the measurement antenna in both the vertical and horizontal positions. During development of products, however, most companies test their products in a semianechoic chamber, which is a shielded room with radio frequency absorbing cones on the walls and ceiling. This semianechoic chamber simulates an open field test site, and eliminates any ambient signals that may be present in an open field environment. An example of this setup can be seen in the following figure.



Another way that companies simplify the FCC test procedure is by using a broadband antenna such as a log-periodic or discone antenna. Such antennas are desirable since,

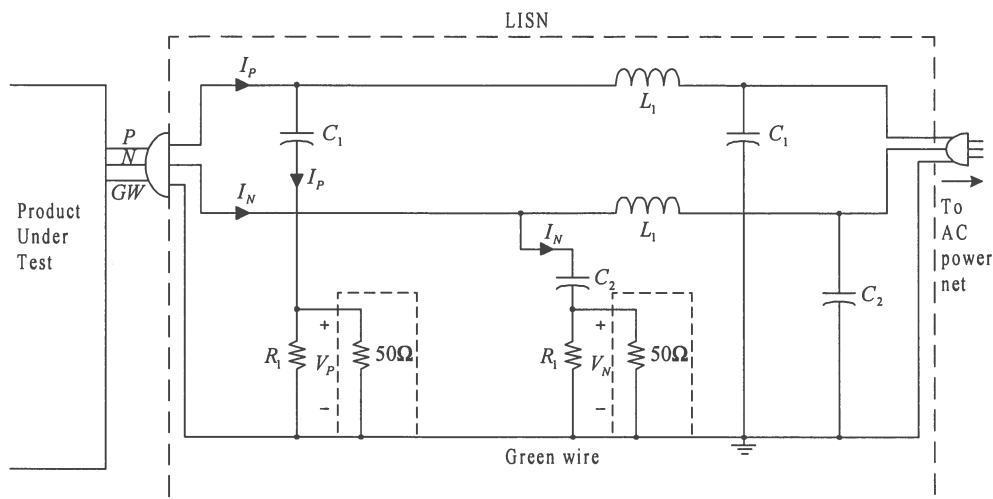
unlike a tuned dipole, their length does not need to be adjusted with each frequency change. This allows companies to test their products using a frequency sweep rather than having to do each frequency separately and adjusting the dipole lengths with each measurement.

One last test requirement for radiated emissions testing is the bandwidth of the receiver being used to measure the signal must be at least 100 kHz. By having such a large bandwidth, the test will not pick up intended narrowband signals such as clock signals, but it will detect emissions from broadband sources such as the arcing at the brushes of a dc motor. A related issue is the detector used in the output stage of the receiver. Although typical spectrum analyzers use peak detectors, the FCC and CISPR test procedures require that the receiver use a quasi-peak detector. This ensures that fast changing, momentary signals such as randomly occurring spikes will not charge up the quasi-peak detector to as high a level as periodic signals. After all, the FCC is not concerned with randomly occurring one time signals. Rather, they are concerned with more significant and frequent emissions that would cause interference with radio and wire communications.

Measurement Requirements for Conducted Emissions

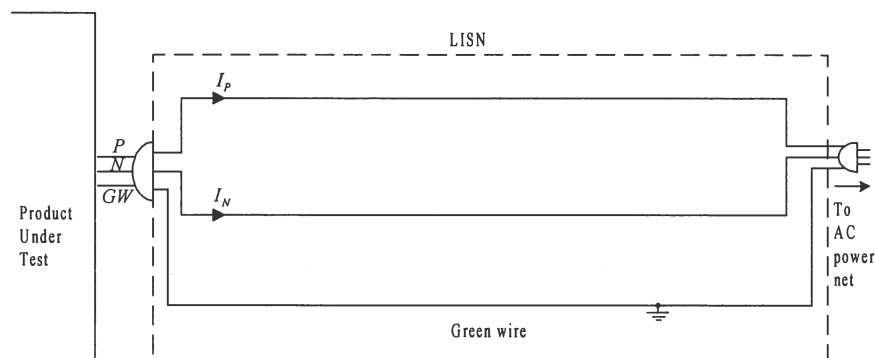
The intent of conducted emissions limits is to prevent noise currents from passing out through the AC power cord of the device onto the common power net of the installation. The common power net of an installation is an array of interconnected wires in the installation walls, and can be seen as a large antenna. Noise currents placed onto the common power net will consequently radiate very efficiently. An example of this is the interference that occurs on your television or radio when you use the blender. The arcing of the brushes of the dc motor in the blender causes noise currents that pass out through the power cord of the blender and into the common power net of your house. The wiring in the house acts as an antenna and radiates the noise, which is picked up as interference in your television and radio.

Therefore, conducted emissions are concerned with the current that is passed out through the power cord of the device. However, the FCC and CISPR 22 conducted emission limits are given in units of volts. This is because the LISN, which is used to measure conducted emissions converts the noise currents to voltage. In order to understand the function of the LISN it is important to understand the standard ac power distribution system. In the United States, AC voltage used in residential and business environments has a frequency of 60 Hz and an RMS voltage of 120 V. The power wires in a home consist of 3 wires, a phase wire, a neutral wire, and the green wire. Both the phase and neutral wires carry the 60 Hz power and the potential between each wire and ground is 120 V. The currents that need to be measured for conducted emissions tests are the currents that occur on the phase and neutral wires.

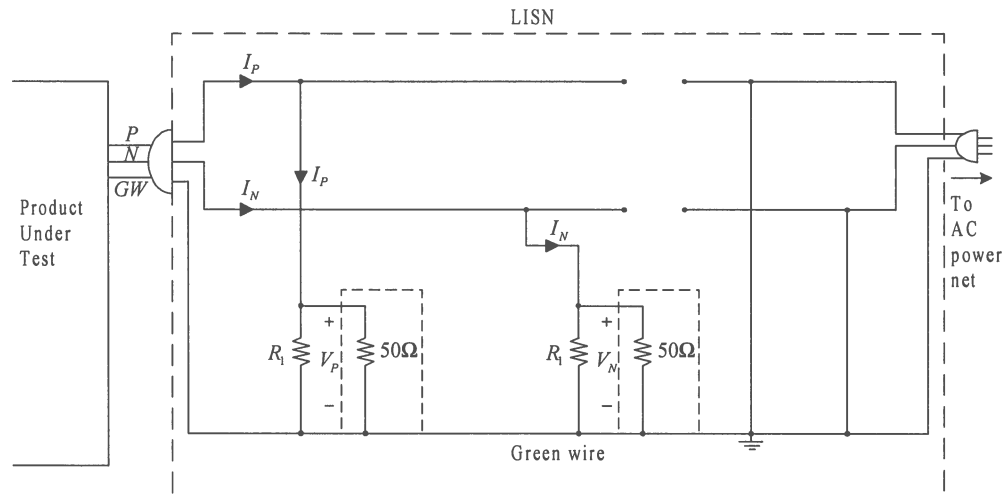


The above figure shows the LISN used for FCC conducted emissions tests. A similar LISN is used for CISPR 22 conducted emissions testing, but the component values are different due to the different frequency range defined by CISPR for conducted emissions testing. The LISN has two functions. The first function is to isolate external noise from the common ac net from contaminating the measurement. The second purpose of the LISN is to present a constant impedance in frequency from site to site to the product between phase and ground and between neutral and ground.

Following is an explanation of how the LISN works. First, one of the $50\ \Omega$ resistors represents the input impedance of the spectrum analyzer, and the other $50\ \Omega$ resistor is a dummy load. The capacitors $C_1 = 0.1\ \mu\text{F}$ is in place to prevent any dc from overloading the test receiver and the resistors $R_1 = 1\text{k}\Omega$ are in place to provide a path for C_1 to discharge in the event the $50\ \Omega$ resistors are disconnected. The product under test should operate normally at 60 Hz power frequencies. Thus, at 60 Hz the capacitors will look like open circuits and the inductors will look like short circuits, and the equivalent circuit will look like this:



Thus the product under test will operate as if there were nothing between it and the ac power net at 60 Hz. In the frequency range of conducted emissions (450 kHz-30 MHz), however, the conductors will look like short circuits and the inductors will look like open circuits. The equivalent circuit will look like this:



Thus, the currents on the neutral and phase lines can be isolated and measured at the 50 Ω resistors. Notice that the currents on the phase and neutral lines have no path that they can get onto the ac power net with.

Additional Product Requirements

As stated earlier, the FCC and CISPR 22 regulations are requirements set forth by law to regulate digital devices. Individual companies, however, self impose their own set of regulations on their products, which are often much more stringent than the required regulations. The automobile industry, for example is exempt from FCC requirements, yet their self-imposed regulations far exceed those that the FCC sets forth for normal digital devices. This is because companies stand to lose far more money as a result of a faulty or poorly designed product, than they would by investing to make sure their product is safe and well designed. After all, people put their lives in the hands of auto manufacturers every time they drive a vehicle, and auto manufacturers cannot afford to have lax standards.

Aside from imposing stricter versions of government regulations on themselves, many companies also impose design constraints on their products that protect against, radiated immunity, conducted immunity, and electrostatic discharge (ESD). The FCC does not regulate these areas because they do not pose a threat to radio or wire communications, so individual manufacturers are left to create their own standards. Furthermore, as each of

these categories pertains to a products ability to function despite outside interference, they are of the utmost importance for manufacturers to guard against. Radiated immunity is a products ability to operate in the face of high power transmitters, such as AM and FM transmitters and airport surveillance radars. Manufacturers test their products by illuminating their product with typical waveforms and signal strengths that simulate worst case exposure that the product could encounter. Conducted immunity is the ability of a product to operate despite a variety of interferences that enter the device via the ac power cord. An obvious example of such interference would be a power surge caused by lightning strike. Manufacturers must design tests that would simulate the effect of lightning induced transients and design their product to resist such interference accordingly. Electrostatic discharge is when static charge builds up on the human body or furniture and is subsequently discharged to the product when the person or furniture comes in contact with the product. Such static voltage can approach 25 kV in magnitude. When the discharge through the product occurs, large currents momentarily coarse through the product. These currents can cause machines to reset, IC memories to clear, etc. Manufacturers test their products by subjecting them to controlled ESD events and design their product to operate successfully in the event of such ESD occurances.

References

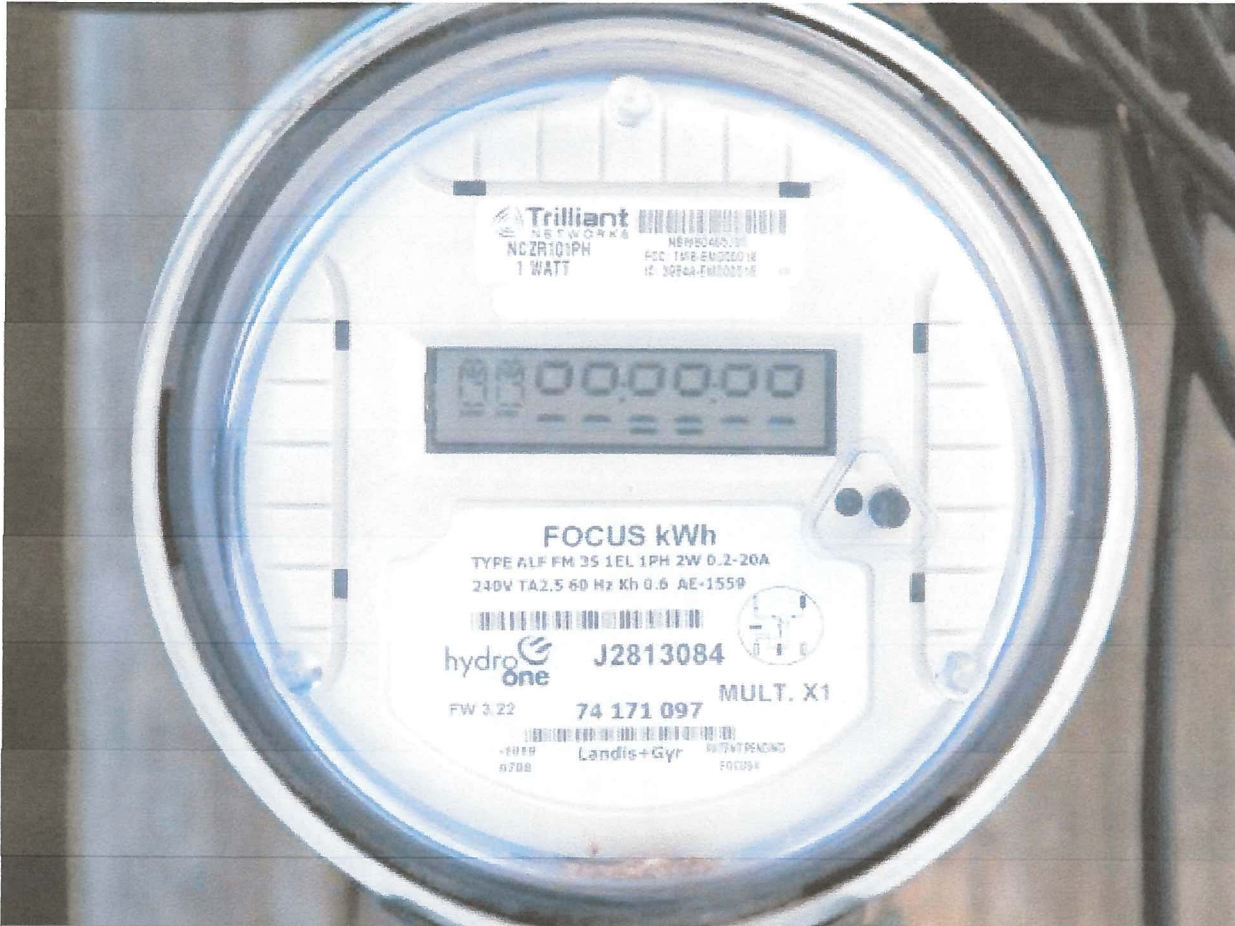
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‘Astonishing’: Hydro One pulling plug on 36,000 rural smart meters after years of complaints

NP

KELLY EGAN, POSTMEDIA NEWS | January 13, 2016 11:32 AM ET

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Postmedia Network filesThe introduction of smart meters to Ontario, mandated by the Liberal government at a cost of about \$2 billion, created peak and off-peak rates that were to spark a conservation drive across the province. The results have been disappointing.

Hydro One has taken a new approach to pesky smart meters that refuse to send a reliable signal about electricity consumption in rural Ontario.

Give up on them.

The utility, which was ordered by its provincial masters to install the devices, admits it has decided to manually read roughly 36,000 meters instead of counting on the wireless technology.

“Astonishing,” was the reaction from Lanark-area MPP Randy Hillier, who has been deluged with complaints about Hydro One billing and smart-meter suspicions.

“I’ve been banging my head against the wall for the last five years, saying we’ve got problems with smart meters in rural Ontario.” Since first being elected in 2007, no single issue has attracted as much attention in his riding, he said.

One of the main complaints, Hillier explained, is that the terrain in rural Ontario is such that the wireless meters — which send out a continuous signal to permit time-of-use billing — frequently fail. Turns out it’s absolutely true.

“The evidence has been in front of us for a long time. It doesn’t work, it hasn’t worked and now (there’s) an admission that it will never work.”



Wayne Cuddington / Ottawa CitizenCattle farmer Nancy Zwarts in 2013. Her new smart meter wasn't transmitting data to the utility.

His conclusion is based on a letter from Hydro One being sent to a number of residents outside Perth in eastern Ontario, including a handful on Barries Sideroad, about five kilometres north of town.

One was dated Dec. 25, which caused Hillier to wonder whether the utility was now employing elves or festive-resistant computers. But that’s another story.

Here’s a portion: “Over the last few years, we’ve learned that it isn’t possible to economically connect all meters to the smart meter network. Nor is it possible to make all meters communicate reliably enough to issue regular time-of-use (TOU) bills based on actual meter readings.”

So the customer was told Hydro One was moving her to the so-called “two-tier” system, which charges a lower rate for the first block of kilowatt hours, then a higher amount above this threshold. The meter will be read quarterly and bills in between will be based on estimates.

Hillier is pleased with the change. Malfunctioning meters were among several issues that caused a customer relations nightmare for Hydro One in 2013 and 2014.

So much for trying to get people to use off-peak mostly! They basically admit that they cannot make the smart meters work outside of populated areas

When Hydro moved to a new billing system, it was buried with complaints, numbering in the tens of thousands. Some customers were double and triple billed; some had no bills for months; others were comically billed millions in overcharges.

When Ontario's ombudsman stepped in, the office of André Marin was flooded with more than 10,000 complaints. Hydro admitted its errors, even sending about a million letters of apology to its customers.

The introduction of smart meters to Ontario, mandated by the Liberal government at a cost of about \$2 billion, created peak and off-peak rates that were to spark a conservation drive across the province. The results have been disappointing.

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- [Kelly McParland: Ontario Liberals are peddling Hydro One for the equivalent of a payday loan](#)

"So much for trying to get people to use off-peak mostly!" wrote Barries Sideroad resident Gregory Jaques, who also received a Hydro letter about manually readings. "They basically admit that they cannot make the smart meters work outside of populated areas."

To make things more curious, Jaques reports that Hydro only weeks ago installed a repeater on an area pole to boost the signal from the meters. It was working fine, he said, when Hydro announced it was abandoning the plan.

"It's a waste of money, from someone's point of view."

Hydro One, meanwhile, says it knew it had a problem on its hands in rural areas and successfully applied to the Ontario Energy Board to switch from TOU meters to manual readings. The board approved the change in March 2015.

Some rural customers were baffled by the technological problems. It was especially laughable when Hydro responded that leafy trees could interrupt the signal, as though the presence of trees in the countryside came as a surprise. At the height of the crisis, Hydro said about six per cent of its one million customers were having "billing issues."

Hillier only shakes his head at the countless hours customers have spent with Hydro's call centre, the frustration of trying to be heard and the repeated errors that, in some cases, have threatened financial ruin on small businesses. And, now, to pull the plug on the meters altogether?

"Anytime a government agency doesn't cause stress or anxiety is an improvement."

ONTARIO PULLS PLUG ON 36,000 RURAL 'SMART' METERS: IS BIG ENERGY IMPLODING?

JOSH DEL SOL JANUARY 20, 2016

18 OK



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Last night I watched *The Big Short* — maybe the most important Hollywood film in years. This true story is a powerful and eloquent invitation to wake up to the sheer depravity at the core of the system of commerce.

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The fact that the film got nominated for 5 Oscars including Best Picture is a huge sign that there are way more people waking up than we ever thought. The wrongs may not be getting righted as quickly as we'd like, but it is happening.

The reality of this shift is clearly evidenced by this news last week from Ontario. After years of obvious problems, Hydro One finally **admitted that rural 'smart' meters do not work**, and has decided to pull the plug on 36,000 of them — to start. We will see more utilities begin to do likewise. [UPDATE: BC Hydro just **announced plans to remove 88,000 meters suspected of failure.**]

Costing ratepayers billions, smart meters are actually designed to unlawfully harvest detailed data of the in-home activities of occupants without their knowledge or consent.

As reported by the *National Post*:

"Astonishing," was the reaction from Lanark-area MPP Randy Hillier, who has been deluged with complaints about Hydro One billing and smart-meter suspicions.

My name is Jaime Chimner from Cheboygan, Michigan near the Mackinaw Bridge. I am Permanently Disabled.

From 2009 to August 2015 I had a (supposedly non transmitting) digital opt out meter on my house and I was unaware of it. On August 2015 my husband Joe cut the main breaker on the house. Why? You may ask. My health, and his, had deteriorated soon after moving into his home in 2009. I went from a cane to a walker to a wheelchair and homebound by 2015. I was paralyzed from the waist down most days and in such severe sharp pain through out my body continuously at its worse from 2013 to August 20, 2015. I wanted to die. That next morning after he shut off the breaker I could walk! My pain level was greatly reduced and I was laughing! My husband, and friend and Doctors were in shock.

4 of my Doctors wrote letters stating I needed an analog meter on my house for my health or I could die. On August 20, 2015 Joe immediately ordered an Analog meter and he put it on the house August 26, 2015. I could finally live in my house without a headache, buzzing in my head and body, muscle spasms, jerk movements, blindness, anxious. I have muscle damage throughout my body now and I am Electricalmagnetic Hypersensitive now as well as other sensitivities. That digital meter intensified what medical issues I may have had and added others. No one will help us!

Consumers Energy wouldn't work with us. **They cut our power on Sept. 11, 2015 because I refused the digital meter back on my house.** Mr. Dennis McKee from Consumers Energy cut our power at 2 pm sept. 11, 2015. We are going through our second winter without electric and I am permanently disabled. So we could survive we had to take out a loan to get natural gas radiating heaters, batteries so we could recharge for LED strip lighting, a generator we didn't have and the gas for it, how were we going to keep our chickens and ducks warm in the winter.. We couldn't afford that. I have medical devices that need electricity to work. My health has improved 10 fold since that digital meter was taken off our home but I was left with worsened asthma, the need for my breathing machine, my special air cleaners and other machines I need. But we still have no electricity and Consumers has decided we don't exist,,,unless I take a digital meter on my house.

That digital meter was from 2006, the first year they put in the switch mode power supply. That is the main problem with the smart meters and digital meters. The analog meter has surge arresters and digital meters don't and the smart meters aren't UL approved or ANY independent approval. It is harmful to your health, I AM THE EVIDENCE as are many more people here. But no one will help us.

Part of the solution is to hardwire computers, hardwire your phone, DTE opted us out of the new gas meter and we didn't even have to ask, ATT hardwired our phone no problem, the local water company opted us out of the smart water meter, they didn't want to subject us to that also. Now where is the problem with Consumers?? As so many people tell us-they can't believe we still don't have electricity and what was Consumers problem? I ask myself that daily.

We DESPERATELY need METER CHOICE in order for any chance of electricity with a mechanical analog meter. Please support this bill.

I am so grateful to have most of my life back but we feel punished. Joe wanted to find the reason for my decline and he was afraid I couldn't hold on any longer. It seems a man gets punished for saving his wife's life.

Please help us.

Respectfully

Jaime Chimner
2/20/2017

Kevin Gawronski

From: d daxx <djdax17@hotmail.com>
Sent: Saturday, February 18, 2017 6:15 PM
To: Kevin Gawronski
Subject: "smart"??meters

Greetings, my name is Donald Fleming and I live in Novi, MI. In 2005 I was driving in Monroe and experienced a feeling of cold, light-headedness, and I feared that I would pass out. I recovered and that week I saw my Doctor, Doctor Robert K. Brateman from Novi, and he recommended seeing a Specialist. I did and was told that I experienced a transischemic attack (sp?). After attending a meeting, without any preceding connection, I learned about smart meters. Within three (3) days after the first experience, and many such experiences after, I was rushed to the hospital to the emergency and an on-demand pacemaker was determined to be a solution. When you consider that I was having at least a dozen such experiences daily, and was notified that they were precursors to a heart attack, I became very concerned. It was only later that I discovered that DTE has installed such a meter three (3) days before the initial attack. As I stated above I kept experiencing similar attacks so I wrapped the meter with a thickness of aluminum and have not had any similar experiences.

A precursor to a heart attack does not justify the DTE explanation that they are harmless. Sincerely, Donald J. Fleming, djdax17@hotmail.com, Novi, MI.

PS There are many European reports that completely explain how dangerous said "smart" meters are!

*"Don't believe everything you think. Thoughts are just that - thoughts." - **Allan Lokos***

A democratic government that respects no limits on its own power is a ticking time bomb, waiting to destroy the rights it was created to protect.

??? James Bovard, *Attention Deficit Democracy*
[2006]

Kevin Gawronski

From: Tara McKnight <tara.l.mcknight@gmail.com>
Sent: Sunday, February 19, 2017 7:40 AM
To: Kevin Gawronski
Subject: House Bill 4220

I am writing in hopes that bill 4220 is written to allow analog meters to stay on homes. It is imperative for my health that this choice is an option for me.

Thank you for all the hard work you are doing! Thank you for being brave enough to stand up for the common people.

Tara mcknight

Sent from my iPhone

From: Frances Sterling <presence1st@gmail.com>
Sent: Sunday, February 19, 2017 9:41 AM
To: Kevin Gawronski
Subject: Digital vs. Analog meter on my home

Sir,

Re House Bill 4220

I will be out of town until March 10th and unable to attend the hearings. I would appreciate my voice being heard.

I am a retired Chiropractor and ex-Managing Partner of Earthcalm, a company who assists thousands in their regaining or maintaining their health due to electrical sensitivity. I have seen first hand how health has declined in many while technology has advanced. Yes they are a small percentage of the population, however independent study has shown everyone is affected whether they are currently exhibiting symptoms or not. As an analogy, did we know decades ago that childhood obesity would be on an alarming rise as it is today when sugary cereals, drinks and processed foods were introduced?

The human body has an incredible ability to adapt and survive until the tipping point. We have reached that tipping point when it comes to technology and subsequent electrical sensitivity.

I am not asking to remove technology. Rather, I am asking for the ability to choose on my own home the RIGHT to have an analog meter remain/instead. I have gone as far as to pay extra for a service which is already provided in order to keep my analog device . As a doctor and well informed on this subject I have gone as far as to purchase a home which had the meter furthest from the master bedroom in the floor plan! Being sure even an analog meter was not on the same wall of my bed was of critical importance to me. (Just as I have moved from a beautiful lake home in White Lake to rural Stockbridge because on this piece of property the reception from the nearest cell tower was poor, and the electromagnetic and microwave radiation was minimal.) While I do not exhibit any outward signs currently that can be called electrosensitivity, I can report that myself as well as my 100% rated disabled Vietnam Vet husband now sleep through the night and awake refreshed in our home, where in our previous house this was not possible, even with various protection techniques from the electrical grid, devices, etc. It has been subtle, however my husband has more energy than he did two years ago before we moved. That is how long it took before I even noticed this was happening.

Is it an oversight that Bill 4220 does not have an opt out clause for those who are informed and are willing to pay to **keep their analog devices, already installed and functioning**? To offer a bill where a digital meter would be forced upon me would have me looking at "off the grid" options. No, I am not a radical. I simply want the best environment for maintaining my health and that of my family. I have fought against "off the grid" options and moving in a direction of self-sustainability because being in community, including part of these United States is of value to me. Please maintain my RIGHTS as an individual!

I urge you to explore authorities outside of the utility companies to learn all the facts. Hear from those who are highly effected by digital meters. Did you know some people, and I have cared and/or advised hundreds, have even moved into tents on their property at times away from all electricity in order to take time to begin a recovery process. With the proliferation of cell phone towers and microwave technology this has been less of an option for those, and certainly in winter it is dangerous.

As you well know, special interest groups who fund their own research even those "well meaning" are influenced on a study's inherent structure. Here is an overview article offering scientific information which can be used for both arguments. Note though one important conclusion: "It is important to stress here the difficulties of demonstrating small changes in gene expression that may occur following in vivo exposure to EMF which are due to inherent variability of biological responses and the **technical limitations in the sensitivity of existing technologies.**"

https://ec.europa.eu/health/scientific_committees/emerging/docs/scenih_r_o_041.pdf

This is why hearing from those individuals who are highly electro-sensitive, whose health, livelihood and their own "pursuit of happiness" is hindered unless they have the RIGHT to choose is VITAL. Please keep an open mind when listening to those who can very well come across as radical, feeble minded or even at times "mentally ill" knowing these people are affected by the cumulative effect of electricity and technological devices. Of course the most effected of these individuals will not be at the hearing as they are too ill expose themselves to such an environment. Thus what may sound as input from someone radical, know they are merely those defending our RIGHTS and represent a far larger, more affected group.

I can offer more information, however I doubt this email or the subject will be addressed properly. I pray it is otherwise.

Thank you for your consideration,

Fran

Dr. Frances B. Sterling
4055 Milner Road
Stockbridge, MI 49285

Kevin Gawronski

From: Sherry L Hayden <sherrylhayden@sbcglobal.net>
Sent: Sunday, February 19, 2017 10:58 AM
To: Kevin Gawronski
Cc: Rep. Phil Phelps (District 49)
Subject: HB 4220

Hello House Energy Committee Clerk Kevin Gawronski,

I am writing about House Bill 4220, sponsored by Rep. Gary Glenn.

We are customers of Consumers Energy, and my family has opted out of the "Smart Meter" program. We pay extra for our choice, which is ludicrous, but it is an important choice for us. We need the option of an analog meter because we have health and privacy concerns.

House Bill 4220 as currently written seems to allow utilities to install digital meters. Any legislation needs to protect customers' rights to choose to have an analog meter on their homes.

Certainly legislators in Lansing must realize the public has no reason to trust that government has its best interests at heart. Repairing this bill to protect choice is an opportunity to try to regain crucial trust.

Sincerely,
Sherry Hayden
813 Maxine St.
Flint, MI 48503

Kevin Gawronski

From: JEROME LAST_NAME <lufeldman@comcast.net>
Sent: Sunday, February 19, 2017 12:03 PM
To: Kevin Gawronski
Subject: House Bill 4220

Dear Michigan House of Representatives,

House Bill 4220 as currently written seems to allow the utility to install a digital meter. We need to have this bill amended so that a customer can choose to have an analog meter on their home. We need the option of an analog meter because people are being affected by the pulsing radio waves being emitted from the smart meter and the digital version without the radio waves creates high rates of dirty electricity into the wiring on our homes. I still have my analog meter but I live in a condo community where the houses are 15 feet apart. Since July 2016 I have experienced tinnitus. This began with a pulsing in my ears like I have never had before in my life. Then the ringing became continuous 24/7. This condition is affecting my health and well-being. Please protect ALL of citizens of Michigan. Thanks.

Luann Feldman

4456 Sunset Blvd.

Grand Blanc, MI 48439

From: Mary Minjeur <minjeur@att.net>
Sent: Sunday, February 19, 2017 2:21 PM
To: Kevin Gawronski
Subject: WE WANT TO KEEP OUR ANALOG METERS

**To Whom It May Concern: C/O House Energy Committee Clerk, Kevin Gawronski,
and Energy Committee Members**

Dear Members:

This letter is a personal description of an incident to **our mobile home in Caseville, MI**, which cannot, and definitely should not be ignored. We are not the only ones who have been at risk having these meters installed and having serious issues as this has happened many times already in Michigan and in other states as well, i.e., California, Oregon, Florida, and Ontario. Additionally, the opt-out function is still transmitting radiation and the cost we have to pay for it is **extortion** at its best! We have had to put up with these undesirable and unnecessary units instead of **keeping our reliable and safe analog meters which have functioned properly and safely for many years.**

Description of the incident is as follows: On July 11 of 2016, DTE informed us that they were going to replace our analog meter with a digital meter at our cottage in Caseville, MI. We immediately responded to their letter on July 15 with objections stating that **we did not want the AMI "smart meter"** placed on our cottage in Caseville, Michigan. Right away we **put up a warning sign for the technicians NOT to install a smart meter on the mobile home property.** **BECAUSE** the fact is, this summer vacation mobile home was manufactured in **1971 which makes it 45 years old.** With that in mind, and knowing that the wiring in some of these older homes is **not compatible** with the newer technology of the smart meter, it is only **common sense to assume the danger and the possibility of a fire or other electrical damage.** We already know it transmits radiation (**RF and emf**) and that **they are not safe for one's health either.**

To continue, on the weekend of Oct. 21, 2016, approximately a week after the AMI meter was installed (and unbeknownst to my husband and myself), we had a get-together weekend with our son and his wife to enjoy the fall colors and campfires. We used our furnace, the dryer and other appliances in the trailer (for the first time after the digital meter was installed) and then went home 3 days later. We left the furnace on (not suspecting any problems) as we have done in the past since we planned on returning during the fall and winter. We pay a neighbor two doors down to check on the furnace weekly to make sure it stays on so that the water pipes don't freeze in the colder weather if the furnace should stop working.

About a week later, our neighbor went to our cottage and called us saying the furnace was not on. He turned it off and then tried to turn it on again to no avail. We called McCain Heating in Pigeon, MI, and he went to check on the furnace. He said it was not operating and not fixable since he could not get parts for the Duo Therm Furnaces anymore and we would have to replace it with a new Trane furnace. **The cost of this furnace was \$1,750 and the total with labor was \$3,387.** However, after installing the new furnace, he went to plug in the main cord to the **fusebox** on the pole outside the trailer to turn on the electricity. However, **as he inspected the wiring and fuses in the fusebox outside the trailer, he found they were MELTED.** He immediately called an electrician from Port Austin, who diagnosed that **it was probably a power surge from the smart meter.** He suggested a **Disconnect Box** at a cost of \$338.20 as a

possible fix to **shut down excessive power coming into the trailer**. This box is actually a circuit breaker which turns everything off in the event of a power overload.

This was exactly what we thought would happen because of the incompatibility of the older wiring when connected to the smart meter. We were extremely lucky that our trailer had circuit breakers inside and we did not have a fire and the whole place burn down! So, because of this smart meter, the estimated expenses we have had to pay is \$3,725.20, and this doesn't include food spoilage and the stress, uncertainty, and aggravation all of this has placed on us!

In summary, this is only background information for one incident, but **what comes next** is what we consider the illegality of what DTE is pushing on us as far as the smart meters are concerned. We contest these meters for health and safety reasons as well and do not want them on our premises. This should be a matter of **CHOICE** for anyone who lives in our republic, The United States of America!

We do not believe there is any federal or state law or MPSC regulation that requires us to have a digital meter. In conclusion, we respectfully but firmly request that we have an analog meter (electro mechanical meter) re-installed and replace the smart meter which we believe is unsafe and unhealthy. We do not accept or want the opt-out smart meter which generates dirty electricity and still transmits information to DTE and costs us \$9.80 a month which we feel is extortion.

Thank you in advance for your thorough investigation of the usage of smart meters and the consumer's option to have a CHOICE OF EITHER ANALOG OR DIGITAL (SMART) METERS. However, Energy Bill 4220, as presently written, seems to allow the utility to install a digital meter. We need to have this bill edited and written so that a customer can choose to have an analog meter on their home because these are our basic rights: to have safety, security, and privacy as American citizens of this Republic.

Please don't disappoint us by ignoring the language of this very important Bill No. 2020 that affects millions of people with regard to EMF and RF radiation emissions set in close proximity to our

personal health and welfare. God bless you in your efforts to protect and ensure our rights and safety.

Please make copies of this letter to be distributed for the meetings scheduled on February 21 and March 7 as we are regrettably unable to attend. A response to this letter would also be appreciated.
Mary Minjeur

Mr & Mrs. Carel and Mary Minjeur
11325 Brougham Drive
Sterling Heights, MI 48312
586-264-5433

Kevin Gawronski

From: Anna Babbitt <babbitt@umich.edu>
Sent: Sunday, February 19, 2017 4:49 PM
To: Kevin Gawronski
Subject: House Bill 4220

Please do NOT pass the above House Bill!

My health has suffered so badly.....since SmartMeters have been introduced into our neighborhood!

I still have my analog meter and am being Affected by the SmartMeters that have been installed in some

of our neighborhood!

My ear ring most of the time, I easily get headaches (which I've not ever had before), have terrible linsomnia, I'm quite dizzy a Lot

of the time, Very Irritable!! And, I've had 3 cancer surgeries this year! The Derm. MD says there is strange

cellular changes to my skin that he's not often seen (places that have Never been in the sunlight, too!).

I even attended a Sleep Study Clinic last year to see why I can't sleep anymore. I didn't 'fit' anything on the

chart! But, I am woken up during the night Regularly, and almost Hourly every night. I've been told that this is

the time the SmartMeters 'talk' to each other!!

We have a cottage in the country where there are No SmartMeters, I sleep through the entire night while we are there!!

My son from out of town was here yesterday and used my computer. He had been sitting there about 5 minutes, when

he called me in and asked what the ringing noise is!! My husband doesn't hear the noise, but my son and I DO! This

is a terrible way to live!!

There are lots of people who have even worse problems than I do, so PLEASE do whatever you can do to STOP us from having to install Smartmeters, and to KEEP our analogs.

Thank you,

Anna Babbitt

Ann Arbor, MI

February 19, 2017

Kevin Gawronski
House Energy Committee Clerk
kgawronski@house.mi.gov

Regarding HB 4220 (2017)

I strongly support Analog Meter Choice and do not want any kind of meter other than an analog meter on my home.

Having researched “smart meters” I have serious concerns about the safety, benefits and invasiveness of this technology. I have read many articles about both “sides” of this issue, listened to a presentation on the problems with “smart meters”, and attended my county commission meeting where numerous residents voiced serious health complaints with exposure to “smart meters”.

Research indicates great potential for harm to human health, in adults and children. The Bioinitiative 2012 Report reviewed over 1800 new scientific studies with evidence for increased risks to human health from electromagnetic fields and wireless technologies including “smart meters” (Bioinitiative 2012 Report: new urgent warnings on wireless and EMF public health risks). The large number of studies and the personal testimony cannot be ignored.

Many people are sensitive to the radiation given off by “smart meters” and other electronic devices. We cannot afford to let all of us, or many of us, be “guinea pigs”. This has happened too often, for example, with tobacco in cigarettes and lead in drinking water.

Residents should have the choice to keep the analog meters, and without a financial penalty. Even the “opt out program” carries health risks as well as additional monthly charges. I am prepared to call or send in monthly readings of my analog meter to the utility company.

It is my hope that HB 4220 guarantees an analog meter. Thank you for your attention to my concerns.

Sincerely,
Anne Sousanis

Kevin Gawronski

From: helen waltman <helenwaltman@yahoo.com>
Sent: Sunday, February 19, 2017 5:09 PM
To: Kevin Gawronski
Subject: Smart Meter related illness

Dear House member, I have been very ill ever since the installation of this smart meter was installed on my house. Please let me know how I can get away from this meter if I cannot get it off my house. Why do I not have a choice to have an analog meter put back on. I do not know where I can go for help on this matter as my freedom of choice concerning my health in this matter has been taken away from me. HELP. Thank you for reading this and maybe you can look into this for me and the other people having problems with this . Sincerely, Helen Waltman helenwaltman@yahoo.com

From: Barbara Savoie <baanlisa32@gmail.com>
Sent: Sunday, February 19, 2017 8:01 PM
To: Kevin Gawronski
Subject: HB4220

The bill as currently written seems to allow the utility to install a digital meter. We need to have this bill written so that a customer can choose to have an analog meter on their home. We need the option of an analog meter so we don't use wireless for data transmission, and which won't put dirty electricity on our homes' wiring. A Digital meter will not serve the purpose of a healthy body.

I have an analog meter on my home as I opted out in the summer of 2015 and yet I now have EHS (how sad!) from the RF radiation and dirty electricity from Smart Meters installed in the neighborhood. When they were first installed I became ill from the RF frequency spikes and dirty electricity and stressed out from the buzzing in every room of my house, 24/7. I bought an RF meter and every room on the East side of my home measured a rating of 4mW/m², spiking every 7 minutes. It is known these spikes are more harmful to our bodies than a continuous wave. I also bought a microsurge meter to measure the dirty electricity. It measures up to 2000/GS units, where 50 G/S units is considered to be safe. I could not use the rooms on the east side of my home for any length of time which included my kitchen. This meant a change in my lifestyle as I was limited in my cooking and baking, and therefore my family gatherings. My garden which was on the east side of my house also did not produce.

In the latter part of November, my neighbor east of me became ill from her meter and had Consumers remove it. As I began to feel better in my kitchen and other rooms on the East side, I measured them again and the radiation and the spiking were gone. This, of course, meant her smart meter was causing the spikes in my home. My family room where I watch TV on the west side of my home still has hot spots of RF radiation as well as the dirty electricity which is still all through my house. I bought a DE filter and put it in the outlet in the family room where I sit. I eventually became sensitized to both the DE filter and the dirty electricity so that leaves me undecided as to what I can do. This is my enigma: When I sit in the family room, within a short time my left eye and temple will react with disturbing pain....because of what?? It has to be something to do with energy, being the only room with both RF and dirty electricity. But then the symptoms (microwave sickness) get worse to what I would call a mini like anaphylaxis, as they travel through my body. I keep as many panel switches off as I can and that means I'm forever going up and down stairs to turn them on and off. I should mention, I am a widow, 84 years old, and have had leukemia for 24 years. It doesn't say much for the golden years! Yes! I am angry.

I believe we should get rid of all smart meters if we love our children and want a healthy environment for them to grow up in. We need to go back to analog, or wire them or use fiber optics. But at least write this bill up to allow for the old analogs to be used, not the Digital as they would still be bad for our health.

Sincerely,

Barbara A. Savoie

1194 Lexa Lane

Flint, MI 48507

Kevin Gawronski

From: Brenda Kotsis <Brenda711@comcast.net>
Sent: Sunday, February 19, 2017 9:32 PM
To: Kevin Gawronski
Subject: House Bill 4220

Dear Sir:

My husband and I are unable to attend the hearing for the smart meters. We are very against having a digital meter put on our home. We would like the **CHOICE** of being able to keep the analog meter instead of acquiring the digital. We feel we are being forced into doing something we don't want to do. WE do NOT want a Smart Meter on our home. We would like the wording in the new bill stating that people have a choice to keep their analog meter or to put a digital smart meter on their home. We are very concerned for our health, safety and privacy. We have done enough research to have these concerns regarding changing meters.

Sincerely,
Ted and Brenda Kotsis
35326 Bobcean
Clinton Township, MI 48035

Email: Brenda711@comcast.net

Kevin Gawronski

From: Tabatha S <tabbyday@hotmail.com>
Sent: Sunday, February 19, 2017 9:56 PM
To: Kevin Gawronski
Subject: Please Ammend House Bill 4220

Dear Mr. Gawronski,

I support House Bill 4220 regarding a non-transmitting utility meter for my home. But the bill as currently written seems to allow the utility to install a digital meter. We need to have this bill amended so that a customer like me, can choose to have an analog meter on their home. We need the option of an analog meter because digital meters produce a high amount of electromagnetic radiation which many of us are very sensitive to. The utilities have been accepting analog meter customers to email a monthly picture of their meter dials as proof of usage. This does not require much more work or inconvenience to the utility. However, its much safer for my family especially those of us with children in the home. Thank you very much for your time.

Sincerely.

Corinne Marley
Warren, MI

Kevin Gawronski

From: Sandra Brioc <s.brioc@att.net>
Sent: Sunday, February 19, 2017 10:58 PM
To: Kevin Gawronski
Subject: I oppose smart meters

I OPPOSE SMART METERS

I HAD TO PAY A FEE NOT TO HAVE MINE INSTALLED. I ALSO PAY A MONTHLY FEE TO HAVE MY METER MANUALLY READ. I CANNOT ATTEND, BUT WISH MY VOICE TO BE HEARD. THANK YOU SANDRA BRIOC, 37258 GREAT OAKS COURT, CLINTON TOWNSHIP 48036

MY MOTHER HAD A METER INSTALLED WITHOUT HER PERMISSION. SHE DOES NOT WANT HER METER.

SHE IS 85 YEARS OLD AND CANNOT ATTEND. HER NAME IS MAGDALINE BRIOC, 38925 COTTONWOOD COURT, STERLING HEIGHTS, MI 48310 586-977=1612

IF YOU NEED TO CONTACT ME FOR ADDITIONAL INFORMATION PLEASE EMAIL OR CALL AT 586 566-5875
TY S. BRIOC

From: Lori Zdrojewski <sunnyshy9@yahoo.com>
Sent: Monday, February 20, 2017 8:05 AM
To: Kevin Gawronski
Subject: Digital meter VS Analog meter CHOICE

Hi Kevin, i am writing today because the bill you are about to pass is misleading and does not change anything. Installing a digital meter whether it is transmitting to the Utility Co or not is STILL A DIGITAL METER. The meter is still transmitting within the home or business. THE CHOICE to keep or have an ANALOG meter is the ISSUE HERE. Not whether any meter can transmit information to the utility company because any digital meter is still transmitting the dangerous dirty energy in the building. WE WANT A CHOICE TO HAVE AN ANALOG METER!!! Just because there is new technology doesn't mean everyone has to use it. This bill still forces us to use the digital meter even if we opt out which we shouldn't have to pay for by the way!!!!

The bill as currently written seems to allow the utility to install a digital meter. We need to have this bill written so that a customer can choose to have an analog meter on their home. We need the option of an analog meter because of the dirty energy a digital meter transmits into the home. Since i have been exposed to the digital meters i have had headaches every day. Prior to the installation of these meters I never had headaches. I have become tired all the time and have aches and pains that I didnt have before. It is an effort to get up and move around. I am not old enough to feel like an old lady.

Sincerely, Lori J Zdrojewski
401 N Sandusky Rd
Sandusky MI 48471
810-648-4207

Kevin Gawronski

From: elasunny@aol.com
Sent: Monday, February 20, 2017 9:06 AM
To: Kevin Gawronski
Subject: House Bill #4220

Dear Mr. Gawronski,

I learned just this morning that the House Committee will be reviewing House Bill #4220 tomorrow. Unfortunately, I am not able to attend. I would, however, like to provide my comments regarding this bill.

DTE Energy alerted me a little over two years ago that they would be installing an advanced meter on my home in the subsequent few months. I immediately wrote to them, indicating that I did not want an advanced meter, copying Michigan's Attorney General and the MPSC. Despite several written communications with DTE, they installed the meter against my wishes in January of 2015. When they installed it, they did not set it as an "opt-out" meter, and a subsequent visit was scheduled to turn the radio off at a charge of nearly \$70. I took time off work to meet them at the house. Not only did the tech not arrive, nobody had told me that a tech had been out earlier in the week when I was not present, and only after I called to inquire as to why the tech hadn't arrived on the scheduled day. On that day, I put a padlock on my gate and have provided monthly readings ever since. Not only had I lost my pay for the afternoon, but DTE's complete disregard for my wishes and my schedule ensured that I would not be so trusting of them in the future.

I could get into the various concerns I have regarding these meters, and the problems I've experienced that I believe are a direct result of the installation of this meter, but the bottom line is that I, as a homeowner, should be allowed to determine what equipment is attached to my home...not a utility company.

I'm very pleased with the majority of the accommodations in House Bill #4220. I would like to suggest a few things.

First, I would like the bill to be clear that, if a resident specifically wants their advanced meter replaced with an analog meter, one will be provided. The language of the bill, as it is written, would still allow DTE to install a digital meter, and I most definitely want an analog meter.

Second, I would like DTE to be required to reimburse residents for the opt-out charges and monthly fees that they were forced to pay since the meter was installed. Despite my written communications with DTE, indicating that I did not want this meter, when they installed it, they did not set it as an "opt-out" meter, resulting in a cost of nearly \$70 for a subsequent visit to turn the radio off. Also, despite my providing monthly readings to DTE, they have continued to charge me a monthly "opt-out" fee of over \$10 per month.

Third, it appears that DTE will be required to replace meters at the residents' requests at no charge, if the meter was installed before this new bill was passed. If I am misunderstanding, I would also like that provision to be made, as I should not be required to pay a fee to replace a meter that I adamantly refused prior to its installation.

I thank you for taking the time to read my email, and hope that these additional concessions will be added to the bill to satisfy your residents who feel they have been ignored and taken advantage of financially by this company.

Sincerely,

Elaine L. Almon
29569 Van Laan Drive
Warren, MI 48092
586-722-4209

Module 8:

EMC Regulations

Introduction

The goal of electromagnetic compatibility, or EMC, is to design electronic systems that are electromagnetically compatible with their environment. EMC requirements exist so that electronic systems designers have a set of guidelines that explain the limits of what is considered electromagnetically compatible. There is not, however, one all-encompassing set of EMC guidelines. Instead, EMC guidelines are created by individual product manufacturers, and by the government. Requirements set forth by the government are legal requirements that products must meet, while the requirements set forth by the manufacturer are self-imposed and often more stringent than those set forth by the government.

Government Requirements

Not all countries have the same EMC requirements. In fact, each country is responsible to enforce their own set of requirements. This does not, however, mean that each country has a unique set of EMC requirements. In fact, the various EMC requirements set forth by all the countries of the world are very similar, and many countries are moving toward accepting an international standard for EMC requirements known as the CISPR 22 standards. These standards have been adopted throughout much of Europe and were developed in 1985 by CISPR (the French translation meaning International Special Committee on Radio Interference).

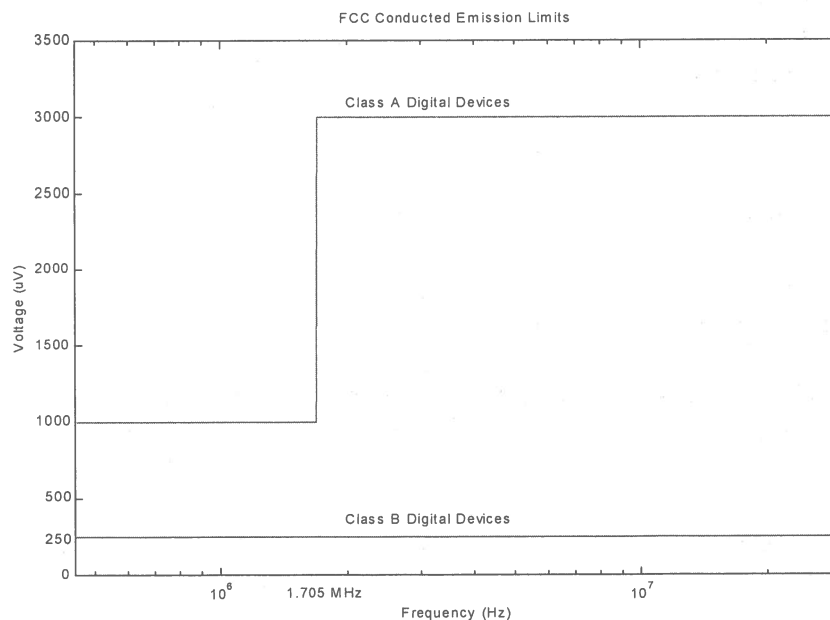
In the United States the Federal Communications Commission (FCC) is charged with the regulation of radio and wire communication. Radio frequency devices are the primary concern in EMC. A radio frequency device is defined by the FCC as any device that is capable of emitting radio frequency energy by radiation, conduction or other means whether intentionally or not. Radio frequencies are defined by the FCC to be the range of frequencies extending from 9 kHz to 3000 GHz. Some examples of radio frequency devices are digital computers whose clock signals generate radiated emissions, blenders that have dc motors where arcing at the brushes generates energy in this frequency range, and televisions that employ digital circuitry. In fact nearly all digital devices are considered radio frequency devices.

With the advent of computers and other digital devices becoming popular, the FCC realized that it was necessary to impose limits on the electromagnetic emissions of these devices in order to minimize the potential that they would interfere with radio and wire communications. As a result the FCC set limits on the radiated and conducted emissions of digital devices. Digital devices are defined by the FCC as any unintentional radiator (device or system) that generates and uses timing pulses at a rate in excess of 9000 pulses (cycles) per second and uses digital techniques... . All electronic devices with digital circuitry and a clock signal in excess of 9 kHz are covered under this rule, although there are a few exceptions.

The law makes it illegal to market digital devices that have not had their conducted and radiated emissions measured and verified to be within the limits set for by the FCC regulations. This means that digital devices that have not been measured to pass the requirements can not be sold, marketed, shipped, or even be offered for sale. Although the

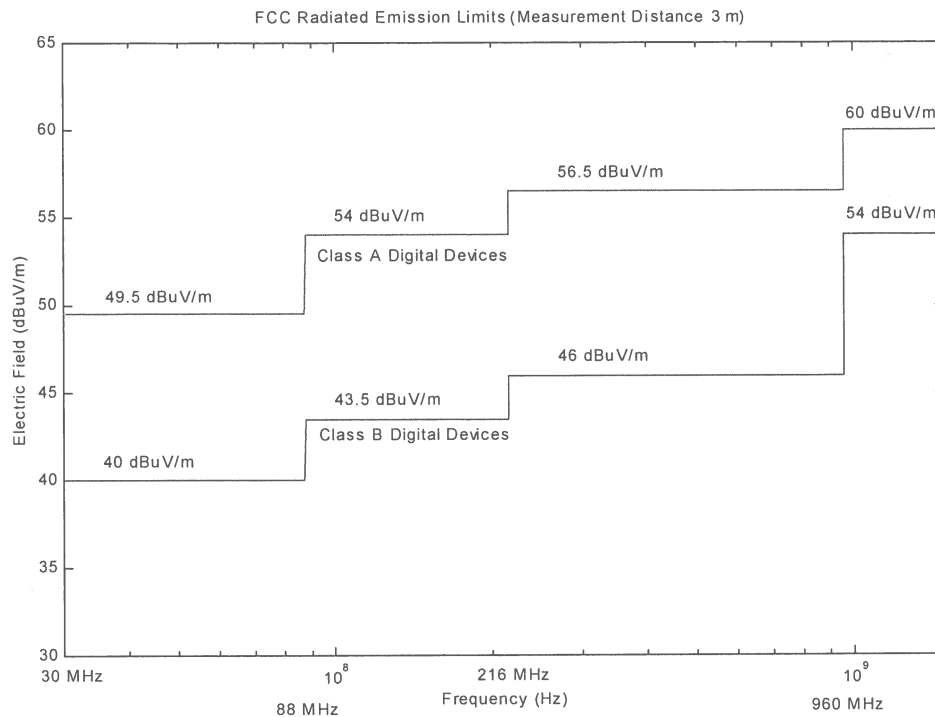
penalties for violating these regulations include fines and or jail time, companies are more concerned with the negative publicity that would ensue once it became known that they had marketed a product that fails to meet FCC regulations. Furthermore, if the product in question were already made available to the public, the company would be forced to recall the product. Thus it is important that every unit that a company produces is FCC compliant. Although the FCC does not test each and every module, they do perform random tests on products and if a single unit fails to comply, the entire product line can be recalled.

The FCC has different sets of regulations for different types of digital devices. Devices that are marketed for use in commercial, industrial or business environments are classified as Class A digital devices. Devices that are marketed for use in residential environments, notwithstanding their use in commercial, industrial, or business environments are classified as Class B digital devices. In general the regulations for Class B devices are more stringent than those for Class A devices. This is because in general digital devices are in closer proximity in residential environments, and the owners of the devices are less likely to have the abilities and or resources to correct potential problems. The following table shows a comparison of the Class A and Class B conducted emissions limits, where you can clearly see that the regulation for Class B devices are more strict than those for Class A devices. A comparison for radiated emissions will be shown later. Personal computers are a subcategory of Class B devices and are regulated more strictly than other digital devices. Computer manufacturers must test their devices and submit their test results to the FCC. No other digital devices require that test data be sent to the FCC, rather the manufacturer is expected to test their own devices to be sure they are electromagnetically compatible and the FCC will police the industry through testing of random product samples.



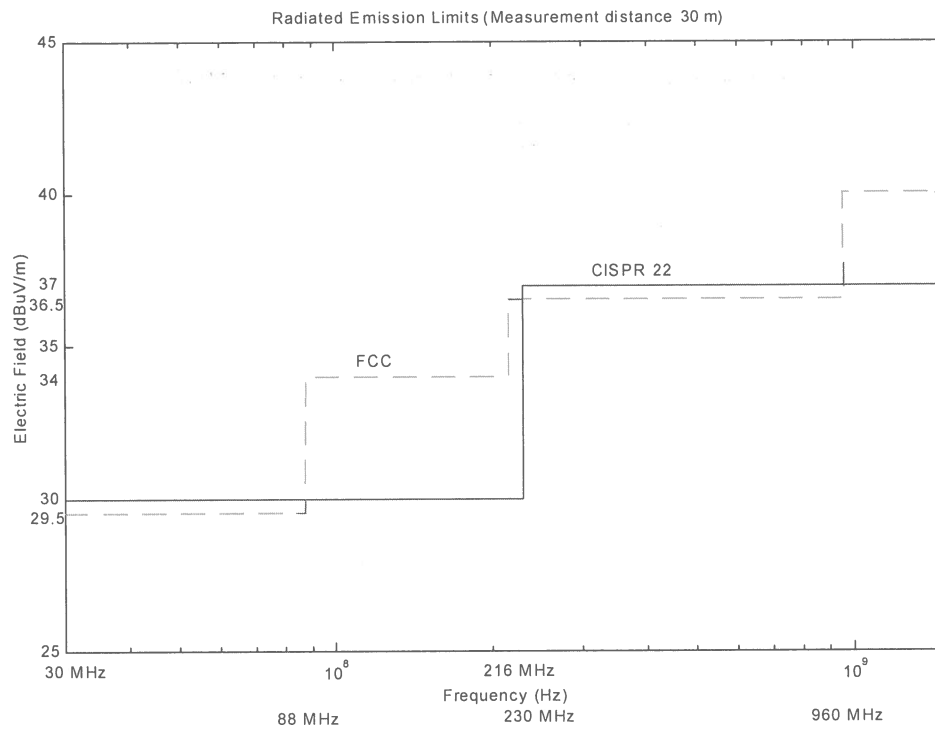
Since the FCC regulations are concerned with radiated and conducted emissions of digital products, it is useful to understand what these emissions are. Conducted emissions are the currents that are passed out through the unit's AC power cord and placed on the common power net. Conducted emissions are undesirable because once these currents are onto the building wiring they radiate very efficiently as the network of wires acts like a large antenna. The frequency range of conducted emissions extends from 450 kHz to 30 MHz. Devices are tested for compliance with conducted emissions regulations by inserting a line impedance stabilization network (LISN) into the unit's AC power cord. Current passes through the AC power line and into the LISN, which measures the interference current and outputs a voltage for measurement purposes. The actual FCC regulations set limits on these output voltages from the LISN even though the current is what is truly being regulated. Radiated emissions are the electric and magnetic fields radiated by the device that may be received by other devices, and cause interference in those devices. Although radiated emissions are both electric and magnetic fields, the FCC and other regulatory agencies only require that electric fields be measured for certification. The magnitudes of these fields are measured in dB μ V/m and the frequency range for radiated emissions extends from 30 MHz to 40 GHz. Radiated field measurements for FCC compliance are done in either a semianechoic chamber or at an open field test site. The product under test must be rotated so that the maximum radiation will be achieved and measurements must be made both with the measurement antenna in vertical and horizontal polarizations with respect to the ground plane.

The method for measuring radiated emissions varies depending on the type of device being measured. Class A digital devices must be measured at a distance of 10 m from the product and Class B devices are to be measured at a distance of 3 m from the product. As explained earlier, the Class B devices, which are marketed for residential use, have stricter regulations and thus must be measured in closer proximity than Class A devices. The following graph displays the radiated emission limits that are defined by the FCC for Class A and Class B digital devices. Because the measurement distances defined by the two requirements are different, we must scale the measurement distances so that they are both at the same distances in order to achieve an accurate comparison. One way to do this is with the inverse distance method, which assumes that emissions fall off linearly with increasing distance to the measurement antenna. Thus emissions at 3 m are assumed to be reduced by 3/10 if the antenna is moved out to a distance of 10 m. So, to translate Class A limits from a distance of 10 m to 3 m, we add $20\log_{10}(3/10) = 10.46$ dB to the Class A limits. This approximation is only valid, however, if the measurements are taken in the far field of the emitter. We can assume that the far field boundary is three wavelengths from the emitter, and with the radiated emissions frequency range defined as 30 MHz to 40 GHz, the maximum distance from the emitter that the measurements will be in the far field is 30 m. Thus, at 10 m not all measurements will be in the far field. At 10 m frequencies of 90 MHz and higher will be in the far zone. So, for the case of this plot, the inverse distance method can be assumed to be accurate for frequencies above 90 MHz, but begins to break down at lower frequencies. However, this comparison still nicely demonstrated how Class B limits tend to be roughly 10 dB more strict than Class A radiated emission requirements.

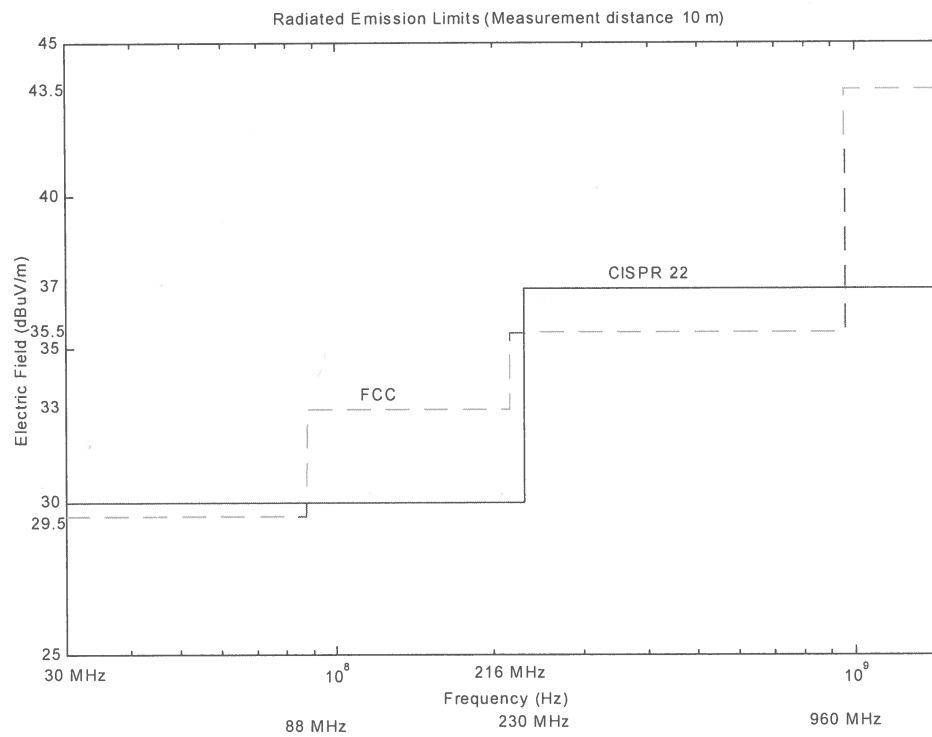


Internationally EMC requirements differ from those in the United States. As discussed earlier, each country is responsible for its own set of EMC regulations. Since the CISPR 22 regulations have been adopted by several countries we will examine them and compare them to the FCC regulations in the United States. CISPR 22 regulations require that radiated emissions measurements for Class A devices be measured at a distance of 30 m and Class B devices be measured at a distance of 10 m. Again using the inverse distance method, we can scale the measurement limits to a common distance and plot the CISPR 22 and FCC regulations together to compare them. As you can see, although the regulations vary slightly in different frequency ranges, there isn't much difference between the FCC and CISPR 22 regulations for radiated emissions.

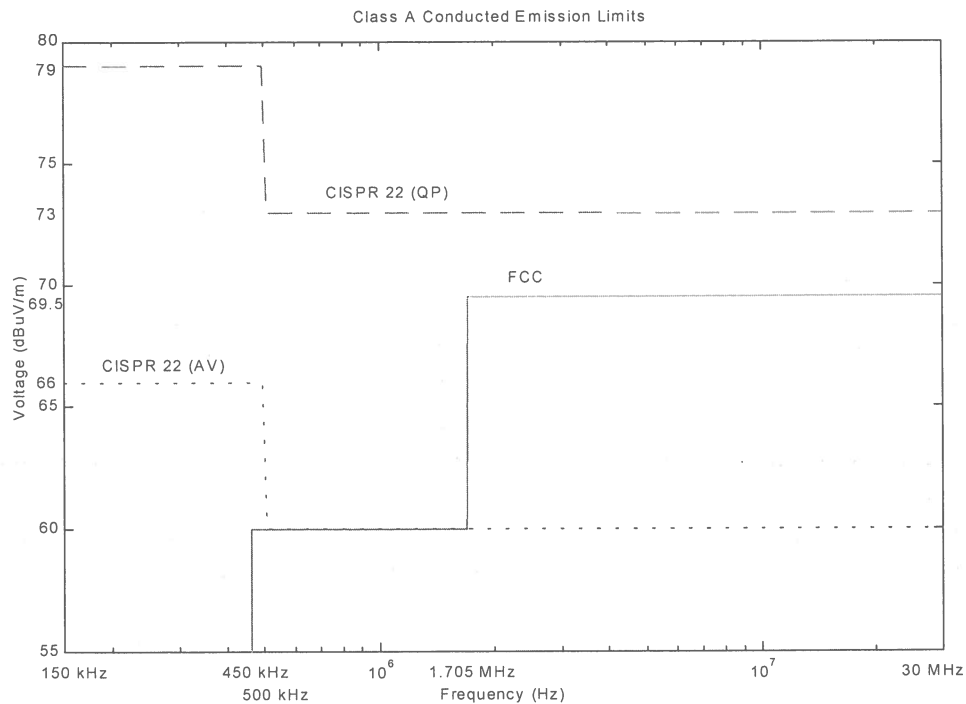
Radiated Emissions Limits for Class A Digital Devices

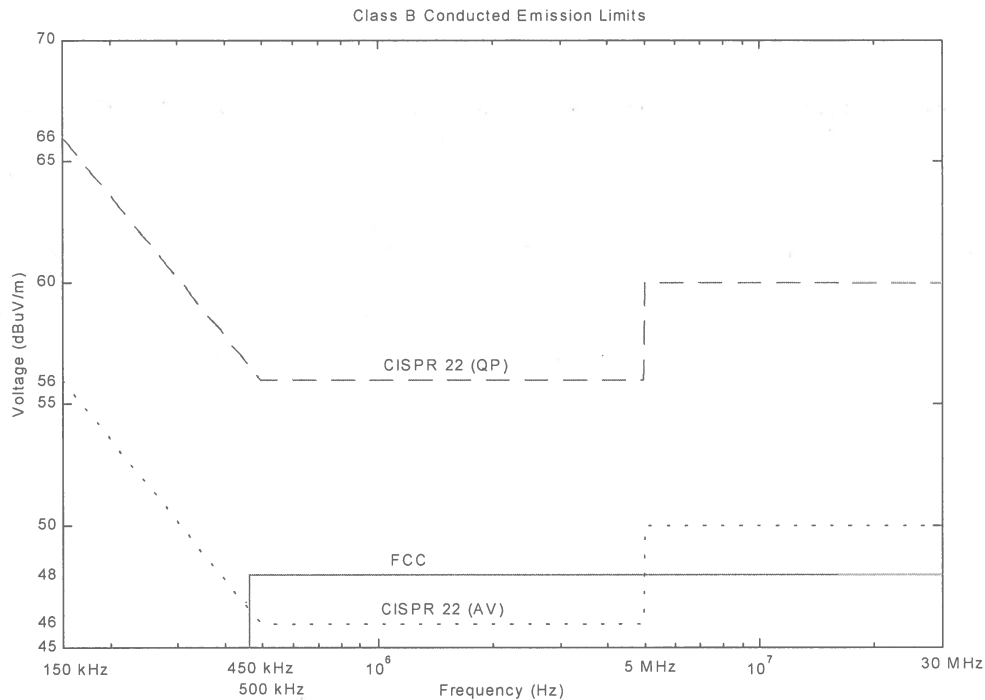


Radiated Emissions Limits for Class B Digital Devices



The differences in the FCC and CISPR 22 regulations become much more obvious when looking at the conducted emissions limits. The most notable difference is the frequency range that is regulated for conducted emissions. While they both have a maximum frequency of 30 MHz, the CISPR 22 regulations extend down to 150 kHz, while the FCC regulations only extend down to 450 kHz. You can see that the CISPR 22 limit for class B devices rises for frequencies below 500 kHz. This extension was put in place to cover the emissions of switching power supplies, which are growing in importance over linear power supplies due to their efficiency and light weight. Another difference is that the CISPR 22 regulations for conducted emissions are given for when the receiver uses a quasi-peak detector (QP) and when the receiver uses an average detector (AV). FCC conducted emissions limits and CISPR 22 and FCC conducted emissions limits all apply to the use of a quasi-peak detector.



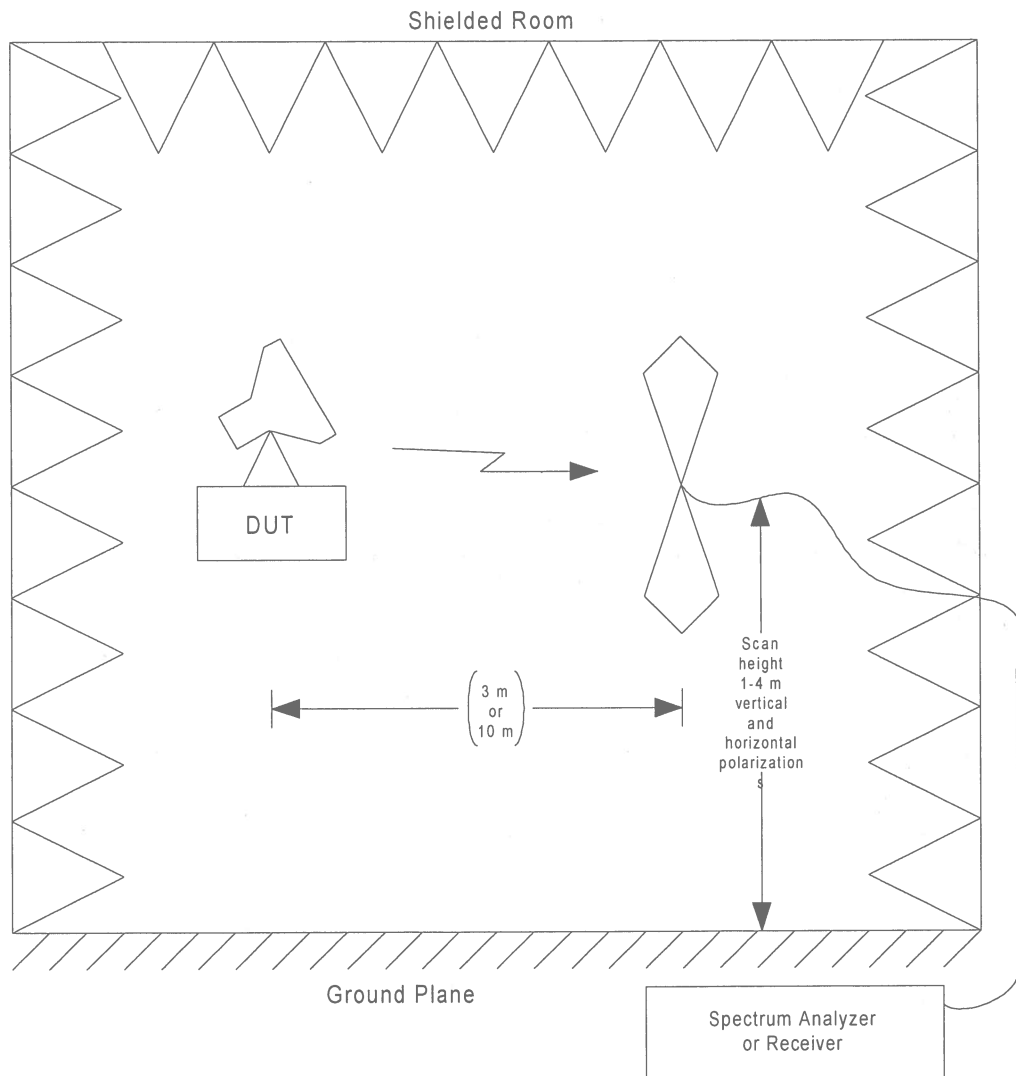


Military EMC regulations also exist. As you would expect, EMC issues are very important in military applications so that missions will not be compromised. Along with conducted and radiated emissions, the military also regulates susceptibility. This is very important in military applications, as it is vital that military equipment is immune to outside interference. The military is more strict in its regulations than the FCC or CISPR and it also has a much larger frequency range that is regulated and has several subdivisions within that frequency range. Additionally, the military may deem to have the EMC requirements waived for certain applications if it is judged that it is necessary to mission success. CISPR and FCC regulations cannot be waived for commercial products.

Measuring Radiated Emissions

In order to ensure that testing for radiated emissions are accurate, the FCC and CISPR have testing standards that explain how testing must be done. This ensures that the testing is accurate and repeatable. For radiated emissions the FCC specifies that the measurements of radiated and conducted emissions must be performed on the complete system. All interconnect cables to peripheral equipment must be connected and the system must be in a typical configuration. The cables and the system must also be configured in a representative way such that the emissions are maximized. For instance, a unit with interior wire harnesses must have the harnesses configured in such that for all possible ways the unit can be assembled with those wire harnesses, the way with the most radiated emissions must be tested. This ensures that for mass production of a unit, the worst case scenario is taken into consideration.

The testing standards set forth by the FCC for radiated emissions testing are very specific and difficult to automate. Radiated emissions are to be measured at a distance of 10 m for Class A devices and at a distance of 3 m for Class B devices. These measurements are to be made over a ground plane using a tuned dipole antenna at an open field test site. Additionally, the tests are to be made with the measurement antenna in both the vertical and horizontal positions. During development of products, however, most companies test their products in a semianechoic chamber, which is a shielded room with radio frequency absorbing cones on the walls and ceiling. This semianechoic chamber simulates an open field test site, and eliminates any ambient signals that may be present in an open field environment. An example of this setup can be seen in the following figure.



Another way that companies simplify the FCC test procedure is by using a broadband antenna such as a log-periodic or discone antenna. Such antennas are desirable since,

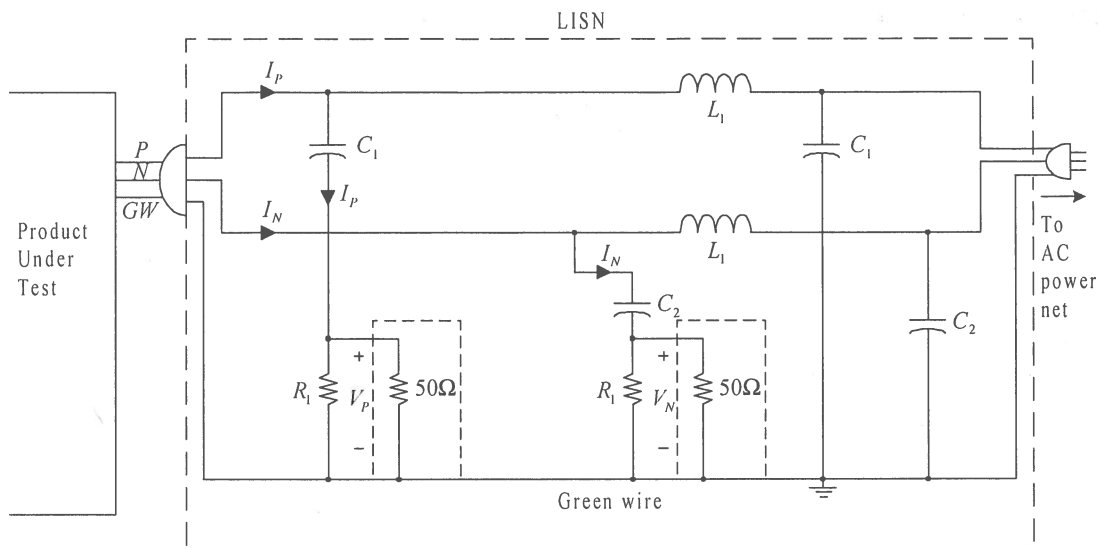
unlike a tuned dipole, their length does not need to be adjusted with each frequency change. This allows companies to test their products using a frequency sweep rather than having to do each frequency separately and adjusting the dipole lengths with each measurement.

One last test requirement for radiated emissions testing is the bandwidth of the receiver being used to measure the signal must be at least 100 kHz. By having such a large bandwidth, the test will not pick up intended narrowband signals such as clock signals, but it will detect emissions from broadband sources such as the arcing at the brushes of a dc motor. A related issue is the detector used in the output stage of the receiver. Although typical spectrum analyzers use peak detectors, the FCC and CISPR test procedures require that the receiver use a quasi-peak detector. This ensures that fast changing, momentary signals such as randomly occurring spikes will not charge up the quasi-peak detector to as high a level as periodic signals. After all, the FCC is not concerned with randomly occurring one time signals. Rather, they are concerned with more significant and frequent emissions that would cause interference with radio and wire communications.

Measurement Requirements for Conducted Emissions

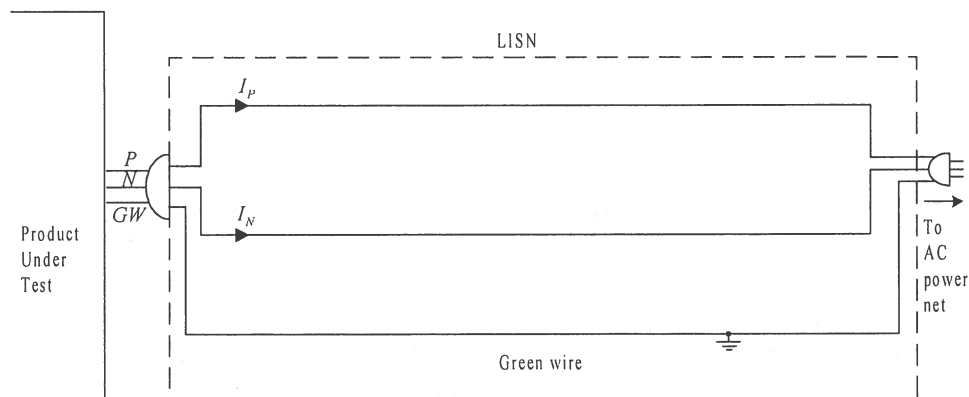
The intent of conducted emissions limits is to prevent noise currents from passing out through the AC power cord of the device onto the common power net of the installation. The common power net of an installation is an array of interconnected wires in the installation walls, and can be seen as a large antenna. Noise currents placed onto the common power net will consequently radiate very efficiently. An example of this is the interference that occurs on your television or radio when you use the blender. The arcing of the brushes of the dc motor in the blender causes noise currents that pass out through the power cord of the blender and into the common power net of your house. The wiring in the house acts as an antenna and radiates the noise, which is picked up as interference in your television and radio.

Therefore, conducted emissions are concerned with the current that is passed out through the power cord of the device. However, the FCC and CISPR 22 conducted emission limits are given in units of volts. This is because the LISN, which is used to measure conducted emissions converts the noise currents to voltage. In order to understand the function of the LISN it is important to understand the standard ac power distribution system. In the United States, AC voltage used in residential and business environments has a frequency of 60 Hz and an RMS voltage of 120 V. The power wires in a home consist of 3 wires, a phase wire, a neutral wire, and the green wire. Both the phase and neutral wires carry the 60 Hz power and the potential between each wire and ground is 120 V. The currents that need to be measured for conducted emissions tests are the currents that occur on the phase and neutral wires.

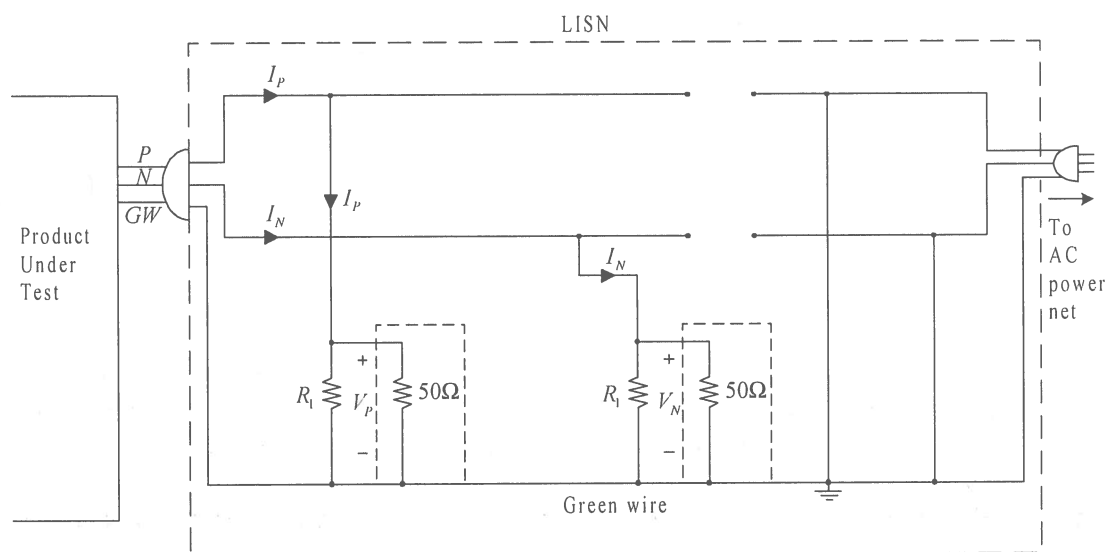


The above figure shows the LISN used for FCC conducted emissions tests. A similar LISN is used for CISPR 22 conducted emissions testing, but the component values are different due to the different frequency range defined by CISPR for conducted emissions testing. The LISN has two functions. The first function is to isolate external noise from the common ac net from contaminating the measurement. The second purpose of the LISN is to present a constant impedance in frequency from site to site to the product between phase and ground and between neutral and ground.

Following is an explanation of how the LISN works. First, one of the 50Ω resistors represents the input impedance of the spectrum analyzer, and the other 50Ω resistor is a dummy load. The capacitors $C_1 = 0.1\mu\text{F}$ is in place to prevent any dc from overloading the test receiver and the resistors $R_1 = 1\text{k}\Omega$ are in place to provide a path an path for C_1 to discharge in the event the 50Ω resistors are disconnected. The product under test should operate normally at 60 Hz power frequencies. Thus, at 60 Hz the capacitors will look like open circuits and the inductors will look like short circuits, and the equivalent circuit will look like this:



Thus the product under test will operate as if there were nothing between it and the ac power net at 60 Hz. In the frequency range of conducted emissions (450 kHz-30 MHz), however, the conductors will look like short circuits and the inductors will look like open circuits. The equivalent circuit will look like this:



Thus, the currents on the neutral and phase lines can be isolated and measured at the 50Ω resistors. Notice that the currents on the phase and neutral lines have no path that they can get onto the ac power net with.

Additional Product Requirements

As stated earlier, the FCC and CISPR 22 regulations are requirements set forth by law to regulate digital devices. Individual companies, however, self impose their own set of regulations on their products, which are often much more stringent than the required regulations. The automobile industry, for example is exempt from FCC requirements, yet their self-imposed regulations far exceed those that the FCC sets forth for normal digital devices. This is because companies stand to lose far more money as a result of a faulty or poorly designed product, than they would by investing to make sure their product is safe and well designed. After all, people put their lives in the hands of auto manufacturers every time they drive a vehicle, and auto manufacturers cannot afford to have lax standards.

Aside from imposing stricter versions of government regulations on themselves, many companies also impose design constraints on their products that protect against, radiated immunity, conducted immunity, and electrostatic discharge (ESD). The FCC does not regulate these areas because they do not pose a threat to radio or wire communications, so individual manufacturers are left to create their own standards. Furthermore, as each of

these categories pertains to a products ability to function despite outside interference, they are of the utmost importance for manufacturers to guard against. Radiated immunity is a products ability to operate in the face of high power transmitters, such as AM and FM transmitters and airport surveillance radars. Manufacturers test their products by illuminating their product with typical waveforms and signal strengths that simulate worst case exposure that the product could encounter. Conducted immunity is the ability of a product to operate despite a variety of interferences that enter the device via the ac power cord. An obvious example of such interference would be a power surge caused by lightning strike. Manufacturers must design tests that would simulate the effect of lightning induced transients and design their product to resist such interference accordingly. Electrostatic discharge is when static charge builds up on the human body or furniture and is subsequently discharged to the product when the person or furniture comes in contact with the product. Such static voltage can approach 25 kV in magnitude. When the discharge through the product occurs, large currents momentarily coarse through the product. These currents can cause machines to reset, IC memories to clear, etc. Manufacturers test their products by subjecting them to controlled ESD events and design their product to operate successfully in the event of such ESD occurances.

References

1. Paul, C. Introduction to Electromagnetic Compatibility, John Wiley & Sons, 1992

Kevin Gawronski

From: Christian & Beth Ann Bechtel <abc_bechtel@sbcglobal.net>
Sent: Monday, February 20, 2017 10:17 AM
To: Kevin Gawronski
Subject: HB 4220 Committee Hearing

Dear Michigan House Energy Committee Members,

Pertaining HB 4220, **please vote Yes on HB 4220**. If citizens do not have the choice of energy provider in Michigan, we must have the choice to chose our meter product that is attached to our home. Since I have a weakened immune system and health concerns, I want to take all precautionary measures to protect my health. The World Health Organization classifies EMFs as a Class 2B Carcinogen and that is what smart meters/digital meters emit. I want to keep my Analog Meter on my home.

PLEASE VOTE YES ON HB 4220.

Thank you,
Beth Ann Bechtel
1165 Cliffdale Drive
Haslett, MI 48840

Kevin Gawronski

From: Charles Langworthy <chucksr@stmichaelselectrical.com>
Sent: Monday, February 20, 2017 11:49 AM
To: Kevin Gawronski
Subject: Meter

Dear Kevin,

I sent the letter to the utility company (DTE) stating that I did not want the digital meter, and they changed it any way.

This was done regardless of my request.

I want an analog meter on my home. Whatever you can do to help this cause, please let us know.

Sincerely,

Charles Langworthy

Charles Langworthy
2471 Nickelby
Shelby TWP MI 48316
586 781 0037

Kevin Gawronski

From: David Lonier <davidlonier@gmail.com>
Sent: Monday, February 20, 2017 1:07 PM
To: Kevin Gawronski
Subject: In support of HB 4220
Attachments: DTE Smart Meters Explode.pdf; Smart Meter DTE 2 Fires.docx; Smart Meter Fires, Fatalities and Liabilities.docx

House Energy Policy Committee
124 North Capitol Avenue
Lansing, Michigan 48933

February 20, 2017

Dear Honorable Chairman and members of the House Energy Policy Committee,

I am writing in support of House Bill 4220, as it addresses the concerns that many of us utility customers have about the new smart meters that are being installed upon Michigan homes and businesses.

Besides the meters' assault on utility users' health, privacy and affordability, the new meters are unsafe and prone to exploding, sparking and causing hundreds, if not thousands of fires. Hundreds of thousands of the meters have been removed due to the fire safety issue.

The meters that are used by both Consumers Energy and DTE are the Itron OpenWay meter.

Features that make these meters unsafe are;

1. Flammable (polycarbonate/plastic) outer shell and flammable internal circuit-boards.
2. Small, weak-pressure contact points for wireless remote controlled on/off switch, subject to pitting and arcing.
3. Contact between the meter prongs and the spring clamps in the box are weak due to smaller dimension of the prongs on the new meters which could cause reported arcing. Also, the clamps could be pitted due to the age of the box.
4. Switch mode power supply where 240 volts AC are converted to lower DC voltage to operate the delicate circuitry of the meter and the power is then sent into the building as 240 volts DC at a much higher frequency than the 60Hz that was received, causing what is known as 'dirty electricity'.
5. The meters are not properly grounded causing surges or lightning strikes to cause circuit burn-outs on the wiring, outlets and appliances in the building.
6. The cheaply constructed, components are made in China. If the meters were constructed according to

electrical safety standards, the cost would be greatly increased.

7, For obvious reasons the meters are not approved as safe by UL or any other safety certifying agency.

Please, for the sake people's health, privacy and safety...lives are at stake here...take all necessary action to bring this bill into law and return our utility service to its original safe function and intent.

Respectfully submitted,

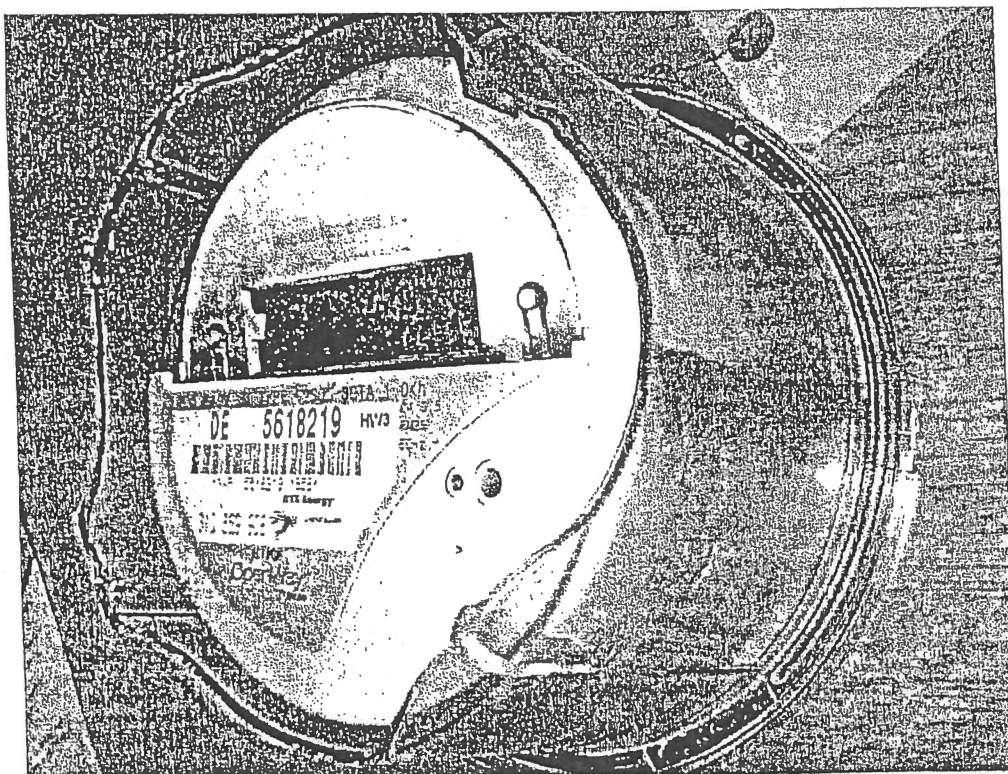
David Lonier
Precinct Delegate
2014 Nominee, State House, 29th District
1842 Commonwealth
Auburn Hills, Michigan 48326
248-373-9111

Attachments:

DTE internal document admitting their Itron OpenWay meters explode.
Two Metro-Detroit (DTE service area) house fires caused by smart meters.
Hundreds of other Smart Meter Fires & Fatalities.

Issued By:
Meter EngineeringNumber:
2015-002Date Issued:
04/23/2015**OPENWAY METERS FAILURE UNDER INVESTIGATION****Purpose of Communication**

Meter Engineering has identified a handful of OpenWay Centron Form 2S 240V meters that have failed due to overvoltage. As you can see in the picture below the front of the polycarbonate meter cover has been blown off. The investigation is ongoing and your assistance is required.

**ACTION Required by All Field Personnel:**

Please contact Florin Moldovan of Meter Engineering at (313) 389-7617 to report such sites and assist with the field investigation.

Written By /s/ Florin Moldovan
Principal Engineer
Meter Engineering

From: David Lonier <davidlonier@gmail.com>
Sent: Monday, February 20, 2017 1:07 PM
To: Kevin Gawronski
Subject: In support of HB 4220
Attachments: DTE Smart Meters Explode.pdf; Smart Meter DTE 2 Fires.docx; Smart Meter Fires, Fatalities and Liabilities.docx

House Energy Policy Committee
124 North Capitol Avenue
Lansing, Michigan 48933

February 20, 2017

Dear Honorable Chairman and members of the House Energy Policy Committee,

I am writing in support of House Bill 4220, as it addresses the concerns that many of us utility customers have about the new smart meters that are being installed upon Michigan homes and businesses.

Besides the meters' assault on utility users' health, privacy and affordability, the new meters are unsafe and prone to exploding, sparking and causing hundreds, if not thousands of fires. Hundreds of thousands of the meters have been removed due to the fire safety issue.

The meters that are used by both Consumers Energy and DTE are the Itron OpenWay meter.

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4. Switch mode power supply where 240 volts AC are converted to lower DC voltage to operate the delicate circuitry of the meter and the power is then sent into the building as 240 volts DC at a much higher frequency than the 60Hz that was received, causing what is known as 'dirty electricity'.
5. The meters are not properly grounded causing surges or lightning strikes to cause circuit burn-outs on the wiring, outlets and appliances in the building.
6. The cheaply constructed, components are made in China. If the meters were constructed according to

electrical safety standards, the cost would be greatly increased.

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Please, for the sake people's health, privacy and safety...lives are at stake here...take all necessary action to bring this bill into law and return our utility service to its original safe function and intent.

Respectfully submitted,

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2014 Nominee, State House, 29th District
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Two Metro-Detroit (DTE service area) house fires caused by smart meters.
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Livonia house fire starts while installing a smart meter

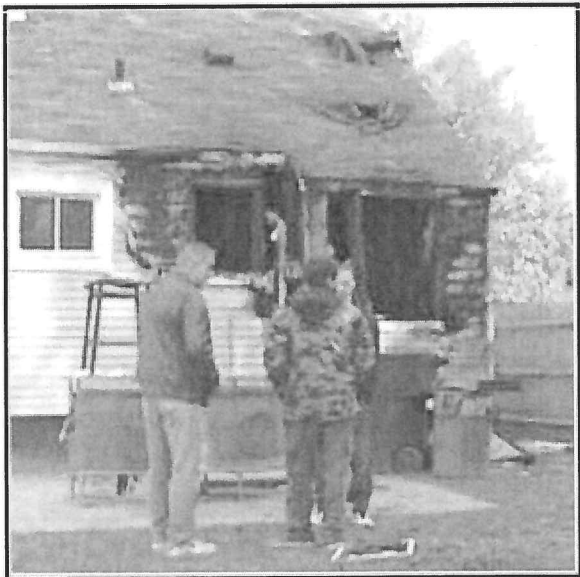
10/25/ 2013 Livonia Michigan. A fire ripped through a Bayberry Street home during the installation of a smart meter. According to the Detroit News the fire caused extensive damage. *"DTE spokesman Scott Simons said service technicians were removing an old meter and installing an advanced meter when they saw signs of fire."*

CBS Detroit also reported on the fire stating the resident Kirk Lytwyn stated: *"A representative from DTE was out here to change the meters and in the process of changing the meters, from what I understand, it blew on him, blew right in his face," Lytwyn said. "Apparently he was wearing the appropriate protective gear."*

Couple escapes house fire, dogs killed: smart meter blamed

October 14, 2014 by K. T. Weaver

Investigators now admit the smart meter "may have played a role in the fire."



A couple barely escaped a house fire with their lives in Detroit, Michigan, early Sunday morning, October 5th, 2014. Sadly, their two dogs were killed in the blaze.

The homeowner blames the recently installed "smart" meter for the fire.

"It was DTE... why my dogs are dead, why my family is ruined, why I have no house, why I have nothing."

Investigators from Detroit's Fire Department say two circuit boxes were connected to the "smart" meter outside the house and one of them blew, but it wasn't immediately clear to investigators whether the smart meter was the cause of the fire.

However, investigators confirmed on October 7th that the "smart" meter "may have played a role in the fire."

Kevin Gawronski

From: Barbara Galster <bgalster@hotmail.com>
Sent: Monday, February 20, 2017 1:11 PM
To: Kevin Gawronski
Subject: Meter Choice Bill HB4220

Dear House Clerk,
I support HB4220 which will give Michigan residents a choice in utility meters.

I would prefer that the bill language be amended to allow residents to keep or have an analog meter installed rather than simply a non transmitting digital meter as currently written.

As a volunteer for a group that supports meter choice I read many testimonials from Michigan residents - real people whose lives have been negatively impacted by smart meters. Homeowners need to have control over what is attached to their home - being forced to accept a meter on ones home - a meter that potentially affects the health of all who live within is wrong.

Thank you.
Barbara Galster
Shelby Township MI

Kevin Gawronski

From: Len Palmeri <len.palmeri@att.net>
Sent: Monday, February 20, 2017 1:14 PM
To: Kevin Gawronski
Subject: HB 4220

Dear Sir,

I wish to voice my support for the passage of MI House Bill 4220.
It is imperative that electric rate payers be able to choose between a digital or analog utility meter.
There are significant privacy, safety and health issues surrounding the digital meter that are simply not present with the existing analog meter.

The bill as currently written seems to allow the utility to install only a digital meter. We need to have this bill written so that a customer can choose to have an analog meter remain on their home. We need the option of an analog meter because the digital meter is a source of dirty electricity induced on the homeowners wiring due the presence of a switched-mode power supply.
Also, many consumers having a digital meter complain of flickering lights, strange hums, and even fires.

Sincerely,
Leonard P. Palmeri
54941 Carnation
Macomb, MI 48042

Kevin Gawronski

From: Jackie Gales <jckgales11@yahoo.com>
Sent: Monday, February 20, 2017 2:02 PM
To: Kevin Gawronski
Subject: smart meter health

I am writing to say I had a smart meter installed on my home last spring. I did not know about the health concerns.. Since then I have had sleep problems, can't sleep most nights, which was never a problem for me, also...no energy, feeling on my skin like insulation stuck in me and itching, ringing in my ears and increase of visual problems which I have been to eye doctor for. Floaters and random blurring. I recently requested a analog meter by email, I was told by email there would be a charge which is wrong but I accepted because I want to feel better. Well Monday today consumers came to put meter on and I spoke with installer and asked if a analog meter was installed she said no it was digital! I told her I did not want digital I want analog she said consumers does NOT have any analog meters! I am extremely upset and now calling them. Thanks

Jackie Gales
989-529-9039
15844 Lincoln rd, Chesaning, MI 48616
Sent from Yahoo Mail on Android

Kevin Gawronski

From: Laszlo Slomovits <laszlos22@gmail.com>
Sent: Monday, February 20, 2017 2:23 PM
To: Kevin Gawronski
Subject: House Bill 4220

Dear Mr. Gawronski,

I will not be able to attend the public hearings on House Bill 4220 either on Feb. 21st or on March 7th, so I would like to ask that you please upload my comments (below) for the committee members to see online.

Thank you, and best wishes,
Laszlo Slomovits
2000 Penncraft Ct.
Ann Arbor, MI 48103

To all the members of the House Energy Committee:

Thank you very much for considering House Bill 4220. This bill is very important to me for a number of reasons:

1. At least four of my friends and acquaintances who have had their analog meter replaced by a smart meter have had their health very adversely affected.
2. I have read a number of scientific articles (which I know will have been provided to you) detailing the negative health effects of smart meters on electro-sensitive people — as well as the lack of long term studies on the long term health effects on those who are not immediately effected.
3. One friend has had a very significant increase (approx. 30%) in his electricity bill starting immediately after the installation of the smart meter, with no change whatsoever in his usage. DTE has not been able to give him an explanation.
4. I currently still have an analog meter on my house, and believe (for the reasons stated above — but also concerns about privacy invasion, fire safety, flickering lights, appliance burnouts — all of which have been reported as issues with some smart meters) that all home owners should have the right to choose — without any financial penalty — to control what goes on our homes that could affect our health and property values — in other words, to continue to have our analog meters.

I understand that this bill, as currently written, would still allow a digital meter (what utilities are calling opt-out meters) to be installed on my home, in place of my analog meter. I respectfully request that the bill be amended to allow homeowners to maintain their analog meter — again, without financial penalty — for two reasons:

1. Digital meters generate “dirty electricity,” which has been scientifically shown to cause health problems. Again, you will have been provided with the documentation on this, but let me add a personal note: One of my friends had a smart meter installed on her home, and managed to get it replaced by a digital meter after her doctor verified that the health problems she started experiencing were caused by the smart meter. Nevertheless she continued to experience the same health effects with the digital meter. She only found relief when she moved to a new place that did not have either a smart meter or a digital meter installed on the house.

2. Digital meters can be made to store usage data that the utility can then collect — a clear violation of privacy rights.

Thank you for considering my request for an amended bill that allows homeowners to keep our analog meters with no financial penalty.

Sincerely,
Laszlo Slomovits
2000 Penncraft Ct.
Ann Arbor, MI 48103

Kevin Gawronski

From: mpalicz3@aol.com
Sent: Monday, February 20, 2017 2:49 PM
To: Kevin Gawronski
Subject: Fwd: HB 4220 - Smart Meters

Mr. Kevin Gawronski
House Energy Committee

Mr. Gawronski:

SUBJECT: HB 4220 - Smart Meters

Please vote against Smart Meters which emit large amounts of radiation, are toxic, cause fires and are an invasion of privacy. Smart Meters allow data collection on customer usage which is then used against them by *shaming* them into cutting down their usage. People have no voice or choice concerning the analog device vs. Smart Meters.

Please advise members of the House Energy Committee about this crime against Michigan residents.

For a better Michigan,
Marlene Palicz
Walled Lake MI

Kevin Gawronski

From: Arlene Larson <larsonrad@gmail.com>
Sent: Monday, February 20, 2017 6:17 PM
To: Kevin Gawronski
Subject: HB4220

Dear Representative Gawronski,

Please vote in favor of HB4220 so that the consumer has a right to meter choice without being penalized monetary if an Advanced Meter is NOT wanted! Also, for privacy, health and safety reasons we should have a choice!!!!!!

Thank you.

Sincerely,
Arlene Larson

1514 W. North St.
Kalamazoo, MI 49006

Kevin Gawronski

From: Dan Schulte <SchulteD@umich.edu>
Sent: Monday, February 20, 2017 7:25 PM
To: Kevin Gawronski
Subject: Smart Meter Position

Please note my opposition to any utility pushing to force Smart Meters on consumers who oppose them. Consumers should have broad authority to reject Smart Meters. Why would we ever allow utilities to steam-roll consumers without regard to their health or privacy issues? Who is the customer here?

Analog meters work fine and do not transmit radiation like Smart Meters do. Our primary concern should be with individual rights, much more so than with feathering a monster industry's already excessive control and profit margins. The primary customer is the consumer/constituent/voter, not a utility that has already crossed the line when it comes to respecting the rights of American citizens who clearly deserve the ultimate say in this matter.

Please feel free to read my concerns aloud.

Danile T. Schulte
Grosse Pointe Shores, Michigan

-->

From: Carole Gorecki <caroleg1776@yahoo.com>
Sent: Monday, February 20, 2017 7:42 PM
To: Kevin Gawronski
Subject: House Bill 4220

The bill 4220 as written seems to allow the utility to install a digital meter. We need the bill rewritten so that a customer can choose an analog meter. Digital meters give off dirty electricity which is unhealthy. Those people who are electrosensitive are suffering or moving out of their house.

I believe that we need analog meter choice. The customers who were given no choice, but a smart meter, an opt meter which is a smart meter shut off, or have their power turned off should have an analog meter reinstalled by the utility company at no extra charge.

I believe as a citizen I should have the right to choose what is attached to my house. I believe that a smart meter is not safe. I know people are subject to more radiation than is necessary. I do not use a microwave, and rarely a cell phone, so a monopoly utility company should not tell me what I must be exposed to. I have a heart issue, and a compromised immune system, so I don't want more health issues.

I am also concerned about the privacy issues and the ability of having information hacked or sold to commercial agencies.

I am also aware of large increases in the bills of the Smart Metered customers. DTE promises that we will know how

to reduce our bill. Most people already know. When I looked at my bill, half of it was usage the other was fees and taxes etc. I still am lucky enough to still have my analog meter. I know I couldn't afford to pay any more.

Thank you for your time.

Sincerely,

Carole Gorecki
36500 North Pointe Dr.
New Baltimore, MI 48047

Kevin Gawronski

From: Micheal Grudnicki <rotunda1954@hotmail.com>
Sent: Monday, February 20, 2017 8:03 PM
To: Kevin Gawronski
Cc: Rep. Gary Glenn (District 98)
Subject: House Bill 4220 Hearings

Dear Clerk Gawronski,

I am unable to attend the upcoming hearings but want to let you know how strongly I feel that an Analog Meter option needs to be included in this bill for utility customers in the state of Michigan. I am from Westland and believe customers of DTE and other power companies in our state should have a real choice of the metering system(s) attached to their home. DTE commercials state that we should "Know Your Own Power", and after doing a lot of research on Smart Meters and their impact on Health, Safety and Privacy, this seems to be an unproven technology forced on their customers.

Since the Smart Meter was installed on my neighbor's home in April of 2014, ten feet from the wall of my bedroom, I believe the RF signals are impacting my sleep apnea, some unexplained anxiety feelings and intermittent AM radio interference in that room. I am a two time cancer survivor and this has me deeply concerned. I have constructed a grounded wire mesh decorative trellis to place in front of my neighbors smart meter in hopes that it would at least cut down on the RF exposure on my bedroom wall.

I have refused to have the Smart Meter installed on my home and have received intimidation letters from DTE threatening to shut off my power if I continue to refuse the meter. As a good standing customer, I find this appalling. As a property owner, I should have the right to control what is installed on my home that could affect my health and my privacy. As an American citizen, I don't believe any utility company has the right to data collect or control a customer's thermostat, appliance or service. The utility company has no business knowing how power is used or controlling the power purchased by a customer.

I understand there is no functional difference between an analog meter and the "So Called" opt-out meter, according to DTE. Both measure your electrical usage and both require a meter reader to come out. So why can't customers keep their analog meters? As written, HB4220 does not specify an Analog Meter option and I believe it should be AMENDED to do so.

Regards,

Micheal Grudnicki
734-560-7650 (cell)



Modern Electricity Meter Safety, Accuracy and Performance Testing

Prepared for

Sensus

Prepared by

EnerNex LLC

Lead Author: Aaron F. Snyder, EnerNex

Contributing Author: Gregory Myers, Sensus

V1.0

August 17, 2016

EnerNex LLC

620 Mabry Hood Road, Suite 300 || Knoxville, TN 37932

Telephone: 865-218-4600 || Fax: 865-218-8999 || Website: www.enernex.com



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Executive Summary

We all expect electricity meters to function seamlessly, transparently, and accurately. A meter should fade into the background – a tireless workhorse – and should be trusted to never over-account for the energy we consume. It may not be top-of-mind, but meter design, testing, and installation methodologies are all critical factors in how that forgotten electricity meter will perform its daily duties.

Today's meters are feature-rich computers, capable of measuring, recording, and transmitting many types of data. Compared with electromechanical, kilowatt-hour-only meters, modern meters operate differently and have the potential to fail differently. As meter design has continued to evolve, we must also investigate whether or not meter testing has kept pace. The right levels of meter testing can replicate actual field conditions to:

- Boost consumer confidence and overall safety.
- Contribute to improved device performance and accuracy.
- Help utilities better plan for installations, device replacement, or faulty socket detection.

But what are the “right” levels of electricity meter testing? There is no single gold standard test, no universal seal that designates superior meter performance. Rather, there are multiple standards that define meter tests along safety and accuracy dimensions. Historically, the American National Standards Institute (ANSI) has provided the fundamental code for safety and accuracy meter testing. Building upon a subset of the entire suite of ANSI tests, Underwriters Laboratories (UL) has layered on its version of safety-focused meter tests as well in their own meter testing standard. Both ANSI and UL provide a solid foundation for electricity meter standards, and they continue to improve the safety and performance benchmarks.

Still there are deficiencies within the existing standards. This report examines the history of electricity meter design and testing. It suggests multivariate testing and further investigation of modern meter failure modes could help address some current shortcomings. Derived from real-world conditions and occurrences, additional testing could help to test, detect, and – in some cases – predict failure at the network, site, and device levels.



1 *Introduction and Motivation*

Electricity meters are designed for endurance and the ability to withstand harsh environments. When they are installed outdoors, they are exposed daily to sunlight, water, wind, dust, and temperature fluctuations. Certain situations may require meter replacements – such as a utility’s life cycle management program (aging), or for accuracy testing (to see if they have drifted), or as part of an advanced metering infrastructure (AMI) deployment. These replacements can disrupt what was previously considered a stable system. Safe and accurate meter function requires several elements to support this system.

Key Components

Electricity customers own the **meter socket** that the meter is plugged into, while the **meter** is the property of the utility (of any type, including an Investor-Owned Utility (IOU), municipal, or cooperative). Should a meter need to be changed, the meter socket may require maintenance to return it to its “factory” specifications. Socket maintenance can mean adjustment or replacement of a few components, up to simply replacing the entire socket. A few of the most common maintenance needs are tightening the connection on the service conductors, adjusting the gap of the jaws, addressing corrosion issues, or completely replacing the jaws. The integrity of the **meter socket** must also be checked to ensure that there are no holes where water may enter and no other signs of disrepair. Many maintenance techniques focus on tightening physical bonds for the current-carrying parts, since loose connections lead to potentially unsafe heating

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conditions. Additionally, the socket needs to be waterproof to avoid creating unsafe paths for current and to minimize corrosion on the interior metal parts.

Current State of Testing

Meters are designed and tested according to standards to ensure safety, accuracy, and durability. The tests stress the meter electrically, mechanically, and environmentally to replicate a range of operating conditions in the field. Those standards are derived from a rigorous process with input from a wide range of stakeholders, including industry experts from meter manufacturers, utilities, and other industry specialists.

As modern metering technology is deployed, and as utilities encounter new issues with installations, there is a need to expand the testing. There are two motivating factors. The first is due to evolving meter types. Modern electricity meters exhibit different operational and failure modes than the electromechanical meters they replace. The second motivating factor is the state of the socket at the time of replacement. Socket deterioration after decades of operation is a common, though often overlooked, contributor to meter performance issues.

There is a process to raise awareness about the need for expanded testing. Additional tests that take modern meters and socket condition into consideration can be defined by a vendor or by a utility, or by a combination of the two. Once the test reaches a certain level of refinement, it may be submitted to the standards associations (ANSI or UL, for example) to be considered for inclusion in the official codes published for the metering industry. This process allows the additional testing recommendations to be reviewed by industry experts who are equipped to evaluate technical design and to determine value in terms of meeting business needs. Those industry experts serve on the standards committee that will ultimately determine whether the additional testing will be codified into future testing standards.

1.1 Type Certification and Implications

Accuracy is a critical metric to determine electricity meter viability. Yet a closer look at the particular failure modes of meters could result in great strides toward increased meter safety.

Type certification focuses on a meter's ability to maintain accurate measurements under a variety of internal and external influences. This accuracy is the basis for customer confidence in their utilities – customers must believe they receive an accurate accounting for their electricity consumption. Type tests also identify design requirements for meter engineers, as well as a standardized way to demonstrate that their designs will satisfy societal, utility, and customer needs.

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Since the type tests prioritize accuracy, meter failure modes are a secondary focus. Presumably, customers are not at risk since they are protected by their service panel equipment. Therefore, a meter can fail within some parameters, but if it continues to function across a pre-determined operating range and no extra energy is misattributed as customer consumption, that meter is still considered accurate.

A few tests examine the failure modes of meter components, such as the cover. The use of plastic covers necessitates a test to ensure that in the unlikely circumstance where an electricity meter cover is exposed to flames, the cover will not contribute to the continuation of the flame. Another example is the internal temperature rise test, used to examine the heat rejection characteristics of the meters as it relates to safe operation over time.

During its operational lifetime, meters can be expected to perform and withstand many operating conditions while safely and accurately serving as a measuring, recording, and transmitting instrument. When meters were constructed from predominantly metal parts and a glass cover, there were a few well-known failure modes that might lead to unsafe conditions. Modern meters are essentially computers with more electronics, more plastic parts (including the cover), and different failure modes that are still being uncovered.

Meter testing has been codified into industry standards since the early 1900s and is maintained in an iterative program that requires revision (or reaffirmation) every five years or so. This cycle is designed to accommodate new technology developments. At the same time, the five-year cycle provides a stable operational target for meter performance, allowing for manufacturing economies of scale. The experts involved in the standardization of the testing bring issues for discussion, propose tests and define new procedures or limits for existing tests. The result is more robust and comprehensive standards testing with each revision.

The introduction of modern, feature-rich metering is a key driver of the current cycle in the standards iteration process. The need to assess the different failure modes of these technologically advanced devices warrants a fresh approach to testing philosophies.

1.2 The Value of Accuracy and Safety

Meter accuracy can be quantified to discrete levels and can be used to compare different devices. The accuracy of the billing quantity, the kilowatt-hour, is directly calculable from a price. For example:

Two meters, one with a straight inaccuracy of 0.5% and another of 1.0%, for a service where the price of electricity is \$0.10/kWh.

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For an annual consumption of 12,000kWh, meter one measures 11,940kWh while meter two measures 11,880kWh. At a rate of \$0.10/kWh, meter one results in an under-charge of \$6 while meter two results in an under-charge of \$12.¹

If every meter under-registered the consumption by 1%, for 100,000 customers, this is \$120,000 per year of lost revenue.

Albeit a simplified example, this demonstrates how accuracy can be directly tied to revenue, and a business case can be built to support investments in more accurate metering.

Safety is more important than accuracy, but is also less tangible. There is a cost for safe service panels, meter sockets, meters, service drops, transformers, lateral lines, etc., but how is overall safety calculated? The industry relies upon setting codes and standards, then applying rigorous testing, and finally certifications, to provide assurance around safety. Nevertheless, there is no directly calculable value for safety.

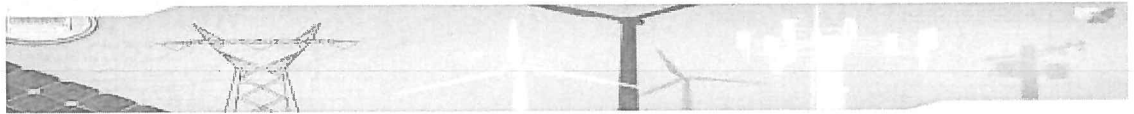
Despite this, the standards are continually revised to accommodate expert contributions and changing operational conditions that inform and help facilitate manufacturing of products that are as safe as possible. Examples of safety-oriented tests include impulse voltage testing, or lightning strike simulation. Devices need to withstand this phenomenon without exhibiting an undesirable failure mode such as melting or igniting the electronics and/or meter housing. Ideally, the device withstands the extremes of the test and continues to operate. However, maintaining operation is not guaranteed. It is still acceptable for a device to fail, provided it fails in a safe manner that protects the consumer.

Other Safety Factors

As previously mentioned, there is a significant potential safety risk posed by the extended time lapse since the initial installation of any meter/socket system. When meters are replaced, it is common to find that those meter sockets require maintenance. Yet socket maintenance is not straightforward. Since the socket is technically owned by the customer, the customer is responsible for maintaining it. Yet the socket cannot be maintained by the customer without removing the meter, which is illegal. Therefore, most sockets are not examined after the initial installation until the utility-owned meter is exchanged.

Assuming the utility has deemed it necessary to exchange a meter, it is rare that the customer/socket owner is even present during this swap, much less have the skills required to

¹ This is much simpler than reality, but illustrative to show the calculable impact of inaccuracy in measurement. The reality is that the population of meters has a statistical range of accuracies that vary within an allowable band.



perform any needed maintenance on the socket. Simple maintenance can be done by utility personnel or contractors, while full socket replacements usually require a licensed electrician.

This scenario illustrates the unrealistic expectations of the end consumer, but the example also highlights the impractical expectations around the longevity of the equipment and system. No manner of type testing and initial specifications intended to prove out designs will cover the performance of the electric meter *and* socket after exposure to field conditions over extended periods of time.

Rather than expecting the system to remain in “as new” condition, the assumption should be that the system will require some repair, then implementing standards around the steps required after any hands-on work to leave a safe, stable meter/socket system in place.

Rarely, the value of safety is defined through legal action, though this is exactly what most want to avoid. When a dispute is litigated, an agreement is negotiated or a decision is made about the relative safety of a device for a particular situation, then a judgment follows specifying the reparations to be made for that situation. Of course, safety value of this type is an unknown and unforeseen variable.



2 *Examination of Testing Goals*

The American National Standards Institute (ANSI) C12.1 standard has been used for electricity meters since the first edition published in 1910. Founded on scientific and technical principles for testing safety and accuracy under a variety of conditions, it also keeps in mind the commercial requirements. There is a host committee that manages the evolution of the standard, and the participants regularly form tactical subgroups to address topics of interest. For example, there have been groups dedicated to harmonics, definitions for power, service switch testing, auxiliary devices, upgradeability, in-service testing, demand type testing, field testing, and temperature rise. These group topics can be influential, as new tests, and even new standards, have been published as a result of subgroup efforts.

In May 2013, Underwriters Laboratories (UL) developed and published UL 2735, an electricity meter safety standard. As a test suite, the standard focuses on safety aspects of the meter and adds to the rigorous tests of ANSI C12.1. Some of the UL tests stress the meter beyond the ANSI C12.1 tests, and also include flammability, shock, impact, and drop tests.

2.1 *Accuracy/Safety Perspective*

ANSI C12.1 defines accuracy tests that account for both internal and external influences. The accuracy of the meter is measured against the performance of a reference. For certain tests, an

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accuracy performance check is required after the test. All testing is done with the industry expectation that the meters will function accurately and safely throughout testing and operation. The following list provides an overview of ANSI testing.

Table 1: ANSI C12.1 Standard Test List (External influence tests are in ***bold italics***)

No load test	Effect of current surges in ground conductors test
Starting load test	Effect of superimposed signals test
Load performance test	Effect of voltage variation – secondary time base test
Effect of variation of power factor test	Effect of variation of ambient temperature – secondary time base test
Effect of variation of voltage test	Effect of electrical fast transient/burst test
Effect of variation of frequency test	<i>Effect of electrical oscillatory surge withstand capability test</i>
Equality of current circuits test	<i>Effect of radio frequency interference test</i>
Internal meter losses test	<i>Radio frequency conducted and radiated emission test</i>
Temperature rise test	<i>Effect of electrostatic discharge test</i>
Effect of register friction test	<i>Effect of storage temperature test</i>
Effect of internal heating test	<i>Effect of operating temperature test</i>
Effect of tilt test	<i>Effect of relative humidity test</i>
Stability of performance test	<i>Mechanical shock test</i>
Independence of elements test	<i>Transportation drop test</i>
<i>Insulation test</i>	<i>Mechanical vibration test</i>
<i>Voltage interruptions test</i>	<i>Transportation vibration test</i>
<i>Effect of high voltage line surges test</i>	<i>Weather simulation test</i>
<i>Effect of external magnetic field test</i>	<i>Salt-spray test</i>
<i>Effect of variation of ambient temperature test</i>	<i>Rain tightness test</i>
<i>Effect of temporary overloads test</i>	



2.2 Safety/Survivability Perspective

UL 2735 testing stresses the meter differently, with some tests designed to replicate conditions other than those by ANSI. Starting with a subset of the ANSI tests, the UL standard then defines additional tests that validate the design of the meters. For example, UL tends to emphasize the lack of exposure to live parts within the design. The different design tests mean UL's failure criteria also differ from ANSI's. In general, while functionality loss is permitted, UL expects that any failure of the device should not result in a sustained dangerous condition. Comparatively, the main concern for ANSI tests is any impact on the accurate registration under the various conditions. The table below lists the defined tests in UL 2735.

Table 2: UL 2735 Standard Test List (*includes tests shared with ANSI C12.1 standard*)

Tests Referenced in UL 2735 from ANSI C12.1	Tests Defined in UL 2735
C12.1 Temperature rise (as modified by 15.7 of this standard)	Flammability test
C12.1 Insulation resistance	Static test
C12.1 Effect of high voltage line surges	Impact test
C12.1 Effect of temporary overloads (as modified by UL 2735)	Drop test
C12.1 Effect of electrical fast transient/burst test	Enclosure requirements
C12.1 Effect of radio frequency interference	Clearance and creepage distances requirements
C12.1 Radio frequency conducted and radiated emissions test	Current transformers requirements
C12.1 Effect of electrostatic discharge (ESD) (as modified by UL 2735)	Batteries and battery charging requirements
	Load control switches requirements
	Printed wiring boards requirements
	Application of fault conditions testing

2.3 What do the differences in tests imply?

The UL standard incorporates many of the ANSI standard tests, but includes additional tests and a paper design review. The two standards are not competitive and one testing approach does not detract from the other – both are valid. There is no superior test that results in better meters. However, different certifications may have different applications and connotations.



Since ANSI code prescribes meter safety and accuracy for revenue purposes, it is the base requirement found in state and local legislations.

From the consumer perspective, UL certification offers familiar validation as it is typically associated with retail electrical products. This can reassure the energy consumer who is more familiar with equipment endorsement featuring a UL logo.

We should note that vendors and utilities regularly define and may require testing that goes beyond the ANSI and UL tests. Examples include:

Water intrusion tests subject the meter and socket to conditions replicating direct water fall, replicating a downspout or continuous hose spray, at full load. The expectation is that no dangerous condition results.

Advanced environmental testing that better mimics field conditions wherein temperature, humidity, and voltages are varied while the meter is functioning. The multiple variables and functional setup goes beyond some of the standard testing that may focus on only one variable such as temperature, without including load.

Highly accelerated life testing (HALT) exposes any design weaknesses and allows quicker iterative modifications to address them.

With all of these beyond-the-standard tests, the expectation is that the meter survives without loss of function or accuracy. The rationale for testing at this level is to better meet installation conditions as compared to the “type” test conditions.

2.4 What do the differences in tests mean for design?

The goal of any test plan is to ensure the product operates as intended, boosting confidence in overall product design and performance. All test results could potentially impact design depending on outcome. Additional tests, such as the UL tests over and above the ANSI core (Table 2), may indicate that a redesign is necessary to satisfy the UL criteria. This would also be true of additional tests as defined by the utility. With more tests come greater demands on the design to help pass those tests. Additional testing can result in robust device designs that surpass the current standards.



3 *Modern Metering Features that Address Accuracy and Safety in the Field*

3.1 *The Kilowatt-hour and Beyond*

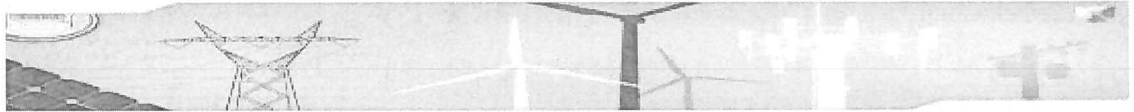
The kilowatt-hour (kWh) is the commonly-used billing quantity for delivered energy. However, using kilowatt-hours to understand other system conditions or to examine issues can be problematic. Today, there are other features or measurements that can be used to address potential accuracy and safety issues where basic kWh information falls short.

For example, ***demand*** – measured in kilowatts – is an extremely useful quantity for managing the grid. When paired with energy, demand can yield valuable information about system conditions, customer behavior, and equipment needs for operations support. ***Voltage*** measurements at every service point, regardless of customer type, are becoming more valuable for grid management, empowering utilities with better, real-time indicators of grid health. Utilities then create programs to further empower their customers by helping manage energy expenses (for certain load types) and through broader customer service. Another feature of modern meters is a robust set of health indicators, commonly called ***flags***. They can be set to immediately indicate potential problems (voltage or outage flags), to support further investigation (tamper flags), to show whether the meter passed various self-tests, or for other uses.

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3.2 ***Analytics***

The additional measures such as demand, voltage, and flags contribute to a continuous data stream that must be managed. Like so many other industries, the electric industry turns to analytics for sifting through volumes of data for useful grid insights.

For example, in a more widespread outage, meters publishing outage flags can provide visibility of the breadth of the outage. Paired with information from the supervisory control and data acquisition (SCADA) system, crews can be rapidly and surgically dispatched to repair, for example, a lost line. However, data analysis of just a few outage flags, paired with voltage values, may indicate issues other than a lost line. Perhaps the line voltage regulator operation failed, or a tap-changing transformer did not operate. Maybe there was some local, distributed generation added to the circuit, or there was a bit of non-technical loss being taken. The access to different data types and sources allows for agile analysis and faster responses.

Advanced analytics allow the system operators to apply their training and knowledge of their system to the new and numerous data from the meters and other grid equipment, permitting them to uncover issues before they escalate into costly and potentially unsafe problems. In the stated examples where generation was added (unknown to the utility) or some non-technical loss occurred, both instances could lead to potentially life-threatening conditions for utility personnel and customers. The availability and analysis of the types of data now available provide unprecedented levels of visibility, awareness, and responsiveness that can translate into safer systems for all.



4 Case Studies

The advances in electricity meter design enable better monitoring of power systems at the consumer level. These capabilities include monitoring the internal temperature of the meter, the load current, and the voltage. These variables are used not just for reporting purposes, but can also alert utilities to take action against the potentially dangerous results of extreme operating conditions.

These design elements are steps in the right direction of preemptive detection, but there are still concerns to be addressed. The fundamental issue of determining socket viability remains elusive. Vendors, utilities, testing organizations, and consultants across the AMI industry have spent years trying to pinpoint whether a meter socket is good or should be replaced, or if that socket can accept a smart meter replacement.

4.1 *Overtemperature and Overcurrent*

Overtemperature is usually due to a high customer load being served, meaning a higher current being drawn through the meter, and a higher internal temperature under the meter cover. Another source of high temperatures is a poor fit at the interface between the meter and socket. This causes minor arcing over the minute air gap and a higher temperature under the meter cover.

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By design, the meters will survive most overcurrent conditions and will continue to operate safely while accurately measuring the load. Customer protection comes from their load panel, where there are fuses or breakers designed to open during an overcurrent condition, thus removing the load from being served.

Meter design features can help safely handle temperature rise, even when not due to loading conditions. Meters can monitor their own internal temperature and be programmed to correlate the temperature to the current draw and time. They can then rapidly communicate that data to utility analysts to aid in deciding whether or not to remove the load.

Many meter vendors provide temperature measured on a single location on the printed circuit board (PCB) that is close to the outer plastic cover. Extensive analysis of several months of data indicates this approach is a successful way of detecting heating issues emanating from the meter socket and meter blade connection. At the 2013 Edison Electric Institute Fall Transmission, Distribution and Metering Conference, American Electric Power presented on how that methodology and analysis permitted the issuance of 525 preemptive work orders during their AMI rollout. Their field technicians uncovered issues on 448 installations needing repair or resulting in replacements. This equates to around a 450 parts per million occurrence.²

Sensus had used a similar technique for years in its products, but recently introduced an enhancement for detecting when these heating events are occurring. Sensus' meters use two separate temperature sensors, one on the PCB close to the outer cover, and a second located internally near the base of the meter. This provides a faster, more accurate detection mechanism, and allows for setting temperature thresholds much closer to the points of heat generation. With dual sensors, the meter can eliminate the effects of solar loading, compare the temperature rise over time between the sensors, and detect if the meter-to-socket connection is overheating.

Confident in the accuracy of the dual-sensor methodology, Sensus developed a meter function that automatically stops power from flowing and discontinues the heating process when in overtemperature/overcurrent states. These meters have service switches with configurable thresholds that can open automatically (with no remote control required) to halt the power flow and overheating. Several utilities have successfully deployed and operated the dual-sensor meters with this function. Hundreds of potentially dangerous hot socket events have been stopped with this dual-sensor technology. One Midwest utility with an existing aging meter population provided the new technology to its entire meter population. Over six months, at

² http://www.eei.org/meetings/Meeting_Documents/Dimpfl,%20Ken.pdf



least 10% of the meters opened their service switches due to the temperatures in the socket exceeding the configured threshold. When the utility visited those sites to investigate, they found that in over 95% of those cases, the meter socket required replacement or repair.

4.2 Voltage

Overvoltage and undervoltage conditions can result from a number of system changes. The voltage lowers as a result of circuit loading, and utilities offset this voltage drop effect with capacitive support (capacitor banks, or “cap banks”) activated under daily, monthly, or seasonal schemes (depending upon condition severity). Tap-changing transformers are another solution for these undervoltage conditions, typically for shorter term variations.

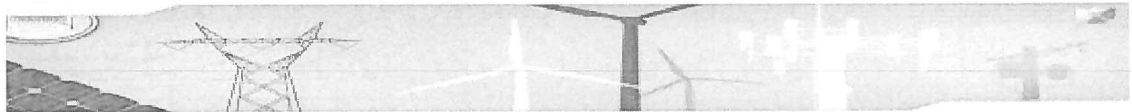
Overvoltages may be either temporary, due to load variations, or long-term, due to designed operations, though within standard limits.³ An example is setting the voltage at the high end of the ANSI standard limits at the substation transformer so the last load point at the end of the longest service circuit is just above the lower limit.

For long-term conditions, such as those caused by lowering the voltage under a voltage conservation program, the utility must use customer meters to monitor the resulting current rise⁴ and temperature to guard against potentially unsafe operations. Rather than focus on a single system parameter, utilities should take a holistic view of the distribution network and metering as one system. This means developing a monitoring and control approach that takes the richer meter measurement suite into account. Programmable meter features can work in concert with distribution network-level equipment to address issues and support service-level-based protective schemes.

Short-term events are usually related to conditions such as lightning strikes, a blown transformer, or a higher-voltage transmission line falling on a lower-voltage distribution line. These faults cause disturbances that can cause a meter fault, or in extreme conditions, may cause a meter to dislodge from the socket, smoke, melt, or burn. There are components to protect the meter and customer from some events, but extreme events could exceed the specification of the meter and those protection components may be consumed during an event, leaving no protection. In addition, customer-oriented overvoltage protective equipment is not part of typical installations. While there are protective devices available, they are usually only

³ ANSI C84.1.

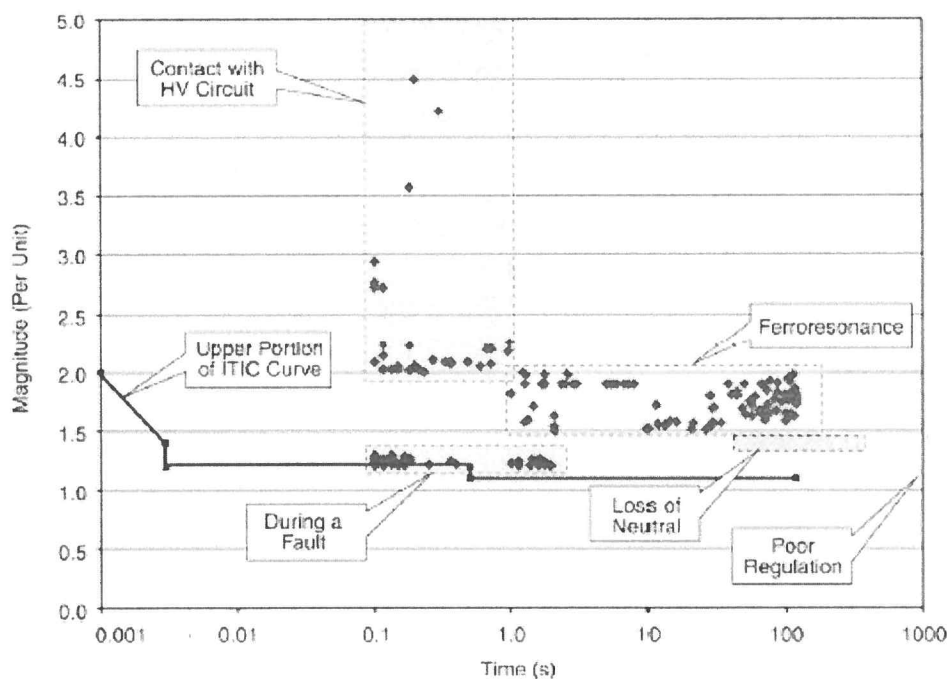
⁴ Constant power loads draw more current when the voltage is lowered if the power demand remains unchanged.



installed on troublesome services and not universally required. These short-term overvoltage events create conditions that are neither wholly contained in the ANSI nor the UL specifications. Testing tends to account for a single occurrence during the test plan. Yet field conditions may see rapid recurrences within a short timeframe, and many events may occur over the service lifetime of the equipment.

Electric Power Research Institute (EPRI) conducted distribution line monitoring to study the “Effects of Temporary Overvoltage on Residential Products” culminating in the March 2005 report on the same.⁵ The conditions detailed both the magnitude and duration of events that residential products and electric meters could see from the distribution system. EPRI’s graph below shows the number of events noted, the magnitude, and the duration. Neither ANSI nor UL 2735 have provisions in their testing requirements that address this wide variety of temporary overvoltage conditions.

Figure 3: EPRI – Temporary Overvoltage (TOV) Events Grouped by Query Results (*Used with permission*)



⁵ *Effects of Temporary Overvoltage on Residential Products: System Compatibility Research Project*, EPRI, Palo Alto, CA: 2005. 1008540.



These conditions may result in not only damage to consumer equipment, but also to the electric meter depending on magnitude and duration.

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5 *Ultimate Benefits*

Today's electricity meter testing and standards are robust. ANSI and UL certifications are comprehensive and their methodologies are iterative. Yet it takes time to prioritize and incorporate new tests that keep pace with current technologies. Additional testing can help fill those interim gaps. Improved consumer safety and confidence, device performance, and overall value are the key benefits of additional testing.

End Consumer Safety

Customer expectations do not necessarily adhere to the timelines required to update the standards. Additional testing is intended to replicate conditions not yet codified but are still reflective of real-world circumstances that end consumers may experience. Vendors, utilities, and other parties all work to improve the testing and requirements for meter and socket products to maintain high quality and safe delivery of electricity.

Device Performance and Accuracy

Additional testing supports device performance and accuracy claims across a broader set of conditions than standard testing. Also the vendors, utilities, and other parties are now exploring multiple variables, where two or more conditions are tested to better mimic actual field settings. Those designing the tests are challenged to identify clear and repeatable success and failure criteria applicable across a variety of products. Also the technical merit and business value must

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be balanced to ensure the overall value of information gained is worth the investment of performing the additional tests.

Utility Business to End Customer Value

Additional testing increases value since the results help to avoid failures that could compromise customer safety. While it's difficult to argue against the value of safety, we must still weigh the costs of additional testing. Typically the cost of testing is spread over a number of devices, and the net value of testing outweighs those costs for both utilities and end customers.



6 Conclusion

Technological advances leave virtually no area untouched, and the electricity meter industry is no exception. Yet the life cycle of meters is long, resulting in a unique mix of circumstances and considerations for the safety and performance of electricity meters. The industry must also factor in the differences in device performance between electromechanical devices and new solid-state meters. Similarly, new installations versus existing installations, where sockets have been in place for decades, directly affect performance and safety.

Meter testing is intended to assess the devices under a variety of realistic, stressful conditions, but there is no silver bullet to preempt every circumstance that could impact meter performance. Standards-based testing yields safe and accurate products. However, utilities, vendors, and other industry parties work to introduce additional testing and design that goes above and beyond current standards. If some testing is good, then it can be even better to add tests that more closely reflect real world conditions. The results of the additional testing can improve overall design to deliver a more accurate, safer product.

Kevin Gawronski

From: Laurie Peace <lapeace22@gmail.com>
Sent: Monday, February 20, 2017 11:33 PM
To: Kevin Gawronski
Cc: Rep. Donna Lasinski (District 52)
Subject: House Bill 4220

Dear Mr. Gawronski,

As I will be unable to attend tomorrow's hearing regarding HB4220, I wish to register my concerns about the current bill as written. It is my intention that my comments be relayed and added to those in attendance and passed along to the legislators who will be voting on this bill.

I strongly urge the House members to AMEND the bill as written, so that any utility customer who wants an ANALOG rather than a DIGITAL/ "Smart Meter", is guaranteed to get one.

Unfortunately, the bill, as written, allows the utility companies to install Digital Meters only. The current "Opt Out" provisions offered by the utility companies do NOT eliminate the "dirty electricity" that digital meters send through our homes, which is scientifically confirmed, and causes health issues for those of us with electro-sensitivity.

I am, unfortunately, one of the more than 1000 customers of DTE whose health has been affected since the installation of a digital meter. I was not advised that this meter would be placed on my home until at least a month AFTER my analog meter had already been removed. Within a period of weeks after digital meters had been attached to my house, I was taken by ambulance to the U of M Hospital ER with what was diagnosed as Supra Ventricular Tachycardia, a racing heartbeat of over 160 beats per minute. As an athlete, with annual physicals consistently showing very low heart rate and blood pressure, I was shocked. This has now occurred MULTIPLE times since the digital meter was installed. A full cardiac workup by the U of M cardiovascular team has revealed NO abnormalities or any reason for the SVT diagnosis, which directly coincided with the digital meter installation. The doctors have advised me that this condition is analogous to a "short circuit", and could VERY WELL BE CAUSED BY ELECTRO-SENSITIVITY.

I have further concerns about the mandated implementation of digital meters:

1. They have not been sufficiently tested for long term health effects on humans or animals
2. They enable the utility companies to access private, home appliance data and usage information that can be sold to 3rd parties
3. They potentially enable the utility companies to access and control our thermostats, appliances, etc., which I find deeply troubling

For these and many other reasons, I strongly encourage the House to allow those of us, who for medical and privacy reasons, wish to have the right to request a CHOICE of ANALOG, not digital meters, on our homes.

Thank you for your consideration, and I trust this information will be passed to the representatives who control the fate of this bill and health of their constituents and own families.

Sincerely,

Laurie Peace

From: Debra Elam <mach3939@gmail.com>
Sent: Tuesday, February 21, 2017 1:42 AM
To: Kevin Gawronski
Subject: House Bill 4220

House Energy Committee Clerk Kevin Gawronski
Please find included a letter written for the hearings on House Bill 4220. We can not be at this meeting but would appreciate it if our opinion on this is heard.
Thank you

February 20, 2017

Dear House Energy Committee:

My husband and I cannot attend your hearings but are very concerned and interested in HB4220. We do want a choice on what kind of meter is put on the side of our house. We would like to keep our analog meter or have the choice to have a new analog meter. We do not want a digital meter that we cannot understand the readings or usage. We and a few of our neighbors have resisted the instillation of a smart meter on our homes over privacy issues involved with them. Some neighbors that have had digital meters installed have had to have DTE out to look at them because bills have doubled or tripled for no reason. We want utility companies to stop at their meter not to intrude on the inside of our homes by using the Energy Star appliances to communicate with the smart meter. Our analog meter keeps utility companies out of our home. Our analog meter can be read by looking at it. If you don't amend this bill to allow a choice of a analog meter you are infringing on my property rights and letting the utility companies come inside my home. The new digital meters let the utility company not only know how much energy I use in my home but when I use energy. The new digital meters are all networked wireless, so like banks and even the government they can be hacked. Giving hackers access to when I am home and when I am not. The hackers could also turn off my electricity, gas or water, or whole neighborhoods by telling it to shut off by computer.

The analog meters work! We don't want the information these digital meters provide to be sold to other people. With a new digital meter they would be able to tell on nights I cannot sleep buy looking at usage on the meter. They transmit every few minutes, why? Unless they are collecting data on us? Right now my analog meter does not tell them when I use anything, just a total usage. Unless someone is standing there watching my analog meter they do not know when I use anything. The meters create dirty electricity which scientists have proven can cause health problems. These digital meters can store fine grained usage data which is wirelessly transmitted to the utility companies. They will come into our homes thru electrical wiring and they will communicate with the energy star appliances, collecting data on my energy usage by minutes. Why do they need to know I get up at 2am and turn on the bathroom light to go pee?? They only need to know my total usage not when I use it. Data being transferred wirelessly can be stolen! Please let our voices be heard for a choice of a analog meter. Please don't force a smart utility meter gas, electric, or water on me. They infringe on my rights, they are hackable, they have made some people sick, and they have caused some home and business fires. We do not want a

digital spy on our home collecting information on us, transmitting it to anyone! The long term medical implications are not known by being exposed to these transmissions. We do not want to be a guinea pig for the utility companies.

On line I am reading that some communities are starting to remove smart meters. DTE has already gone in for a rate increase to cover installation of the new meters, the people didn't ask for or need these, let DTE absorb the cost! Michigan residents can not afford any rate increases!

The *Fourth Amendment* of the U.S. Constitution provides
The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

Please write this bill to include a analog meter choice! Let the customer decide to have a digital or a analog meter. Please give us a analog choice at little or no cost. Please protect the citizens from utility companies coming into our homes uninvited!

Sincerely,

Peter and Debra Elam

39287 Wade

Romulus, MI 48174

734-941-4249

Kevin Gawronski

From: Brian Carten <brian.carten.ts3r@statefarm.com>
Sent: Tuesday, February 21, 2017 3:48 AM
To: Kevin Gawronski
Subject: HB 4220 smart meter -blocked boy from receiving help during medical emergency.

To whom it should concern,

Dec 2015: AMI Smart Meter Installed against my will despite me opting out.

My bills immediately double and almost triple-I can provide proof

I began having memory loss, insomnia, electrical current feelings in body, ringing in ears etc. Diagnosed with poss Lyme and Dementia

I call repeatedly about my extreme bills. Reps state only time that increase is seen is if a neighbor is stealing power from you. May 2016 A rep(Jennifer) comes and reluctantly tested the meter. After stating she never had a defective meter, she states with shock that my meter tested as defective. She stated she had no extra meter with her.

I never receive a new meter or explanation. I call DTE repeatedly and told there is no record of anyone from DTE out to test the meter.

September 2016 I send notarized letter by certified mail giving DTE 7 days to correct the meter or I will have my analog meter installed. Never hear from DTE and proceed to analog meter.

November 2017 – I call and at my inquiry and request DTE opens a billing investigation and told I will be contacted by phone.

December 21 2016- my 12 year old son wakes up with a swollen uvula and has extreme difficulty breathing and can't talk. After calling doctor I go to leave with my three children to get son medical help, I find DTE arriving in my 400' driveway with a van and truck blocking me from being able to leave. For an hour from 10am-11am the **DTE workers refuse after repeated pleas from me , for them to move the truck** due to my sons medical emergency. A third truck arrives and they only move the trucks when completed with shutting off my power. (I have never missed a bill and have actually overpaid).

My 12 year old son is so severe he is admitted into st john pediatric floor by 12 (noon)....within an hour of leaving my home.

I spent 3 days trying to get power back on for Christmas weekend and for my sick son to come home to heat after two days in the hospital. Only by having a friend at DTE with connections help us did the power get turned on. my sick son and other kids had to stay at relatives and friends for the holiday weekend.

Thursday 12-22-2017 a rep (same jenny that did testing in may) came out to install a new meter. When reminded of the defective meter she advised it was programmed with the wrong rate code (for

industrial) and was surprised I never received written notice from DTE and that my meter and bill was never fixed.

I'm still paying double the bill I used to pay in 2015. Also the reps advised that I have had to pay the opt out fees despite the fact that they aren't even capable of reading my meter wirelessly yet.

I have contacted the attorney general office as well as the public service commission regarding our being blocked from receiving medical help during an emergency (it is a law that shut off must cease during an emergency).....received no help.

I demand help and attention to this medical emergency situation and I will have my right to an analog meter.

Brian Carten
Former Police officer and Firefighter
810-305-3534-call anytime

Kevin Gawronski

From: Barbara Lewis-Clark <strokelay.blc@gmail.com>
Sent: Tuesday, February 21, 2017 8:16 AM
To: Kevin Gawronski
Subject: BILL H4220 - ANALOGY METER CHOICE

Dear Mr. Gawronski,

Please express my gratitude to the Energy Committee Chairman that H4220 has come to the floor for a vote.

Today, I will mail twenty-five copies of my concerns and why I need an analogy meter. People need a choice. Please distribute to the Energy Committee Members. I have an analogy meter waiting to replace this smart meter on my home that is causing me health problems.

DTE has placed over five (5) smart meters on my home since 2009 and/or 2010 per a DTE supervisor. I was totally paralyzed in January 2011 in Providence Hospital. My brain swelled in 2015 and 2016. And, I had a memory lapse at the Dollar General store in December. I have lost alot of my hair since September/October 2016.

Please view my video on YouTube "DANGER-DTE Smart Meter". This is radiation on the back of my home. Inside of my home, two kitchen plugs with reset have had to be reset due to being burned out by the smart meter; my garage disposal reset button is burned out with water standing in it; clothes dryer engine burned out (have not washed in four months); replaced outside lights three(3) times so far this year several times last year; refrigerator running continuously over an hour; heating furnace turned off but still trying to kick on (called heating company); smell burning wire and 24/7 high noise level especially between 2AM and 7AM (wake me out of my sleep).

I am very worried about my home caughting fire due to the smart meter on my home. And, what health problems will I have to face now and in the future with these smart meters (water and electric)on my home.

Thank you. Have a good day.

Sincerely,

Barbara Lewis-Clark
18485 Oakfield St.
Detroit, MI 48235
(313)399-4247

Kevin Gawronski

From: Jim Kress <jimkress35@gmail.com>
Sent: Saturday, February 18, 2017 3:24 PM
To: Kevin Gawronski
Subject: Information for the record for the 2/21/2017 and 3/7/2017 Public hearings on House Bill 4220.
Attachments: image001.emz; 30_Dec_2016_flyer.pdf

Dear Kevin Gawronski,

The content of this email and the attached pdf document is for the 2/21/2017 and 3/7/2017 Public hearings on House Bill 4220.

I received the attached document (and the image inserted below) with my December 2016 DTE bill. Page 1, left hand column (also provided as an inserted image below) clearly indicates DTE has (and is) lying about their sampling rates with their "Smart Meters".

DTE claims the programmed interval for randomized transmissions is 4 to 6 hours or longer. "View Energy Use In Real-Time" implies monitoring and data transmission rates are sub-second in frequency. Their statement of "you'll see the impact of turning things off instantly!" validates this analysis.





DTE ENERGY BRIDGE - VIEW ENERGY USE IN REAL-TIME AND DRIVE SIGNIFICANT SAVINGS


By adding the DTE Energy Bridge, you'll see the impact of turning things off instantly!

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In addition, here is the content of a letter I and my attorney sent to DTE officers and board of directors after they threatened to shut off my power on November 2, 2016

November 4, 2016

DTE Officers and Directors
One Energy Plaza
Detroit, MI 48226-1221

Dear DTE Officers and Directors:

On behalf of my client, Dr. James Kress of 7630 Salem Woods Drive in Northville, I called the DTE customer service center on November 2. I was responding for him to a letter sent by DTE dated October 26, which – in essence – demanded that he allow DTE to remove his current analog meter and to install a “smart meter” in its place. The demand was coupled with a threat to cut off his electric supply.

My call was answered by a very polite Ms. Wilson. I noted to her that the demand letter had stated there were “health or safety” issues and that the locking device Dr. Kress had on his current meter was “unsafe for your family and your neighbors.” And I said that we do not believe there are any health and safety issues and invited DTE to provide evidence of such. I further pointed out that the opposite was the case – that the health and safety of the elaborate and expensive electrical equipment in the house would be jeopardized by changing to the so-called “smart meter.” The various computers and electric devices in the house are used by a non-profit, 501(c)(3) foundation dedicated to cancer research. The electrical current coming through the analog meter is a smooth sine curve, whereas, Dr. Kress has learned, the electrical

current that would come through the smart meter has spikes (sharp transients) within the curve. Those sharp transients will cause harm to his extensive assembly of electrical and electronic devices required for the performance of his cancer research. It would not, then, be prudent to change the way the electrical current is being delivered.

I noted the letter suggested that allowing DTE to remove and replace the current meter was "required" and that I did not think DTE had a basis for such and I invited DTE to provide such to me. Further, I said, we would sue if DTE cut off the power without any specific, scientific or engineering evidentiary and established basis for concerns over health, safety, or some other legal requirement.

Ms. Wilson went to speak with someone else. She came back and, while not providing any basis for the "health or safety" issues or for any "requirement," said that Dr. Kress could "opt out" of the advanced meter. I replied that my client would like to do that, and would pay some fee for that, as long as he could avoid replacement of the meter. Ms Wilson then went to speak with someone else again. When she returned, she said that No, he could not keep his current meter but DTE would provide him with a choice of meters – as it turned out, it was not a choice of meters, but the same smart meter would be installed: it could transmit or be set to not transmit data from the house to DTE. I pointed out that it was the same meter, either way, and did not ameliorate our concerns. I said my client would not permit that. She then stated that DTE would come out to the house and cut off the power – and I stated that the matter would end up in court if DTE did such a thing.

The conversation ended there. I neglected to mention one other thing which I point out now: the smart meter, even with the transmitter turned off, has a receiver in it that receives data from inside the house --- not just as to the gross amount of electricity used, but also as to times of use and as to the particular equipment or devices being used. As such, it is a surveillance device --- "observing" and "recording" "events" in a "private" dwelling. And placing a surveillance device, by force, without the consent of the owner, would violate Michigan law. MCL 750.539d provides:

(1) Except as otherwise provided in this section, a person shall not do either of the following:

(a) Install, place, or use in any private place, without the consent of the person or persons entitled to privacy in that place, any device for observing, recording, transmitting, photographing, or eavesdropping upon the sounds or events in that place.

(b) Distribute, disseminate, or transmit for access by any other person a recording, photograph, or visual image the person knows or has reason to know was obtained in violation of this section.

(2) This section does not prohibit security monitoring in a residence if conducted by or at the direction of the owner or principal occupant of that residence unless conducted for a lewd or lascivious purpose.

(3) A person who violates or attempts to violate this section is guilty of a crime as follows:

(a) For a violation or attempted violation of subsection (1)(a):

(i) Except as provided in subparagraph (ii), the person is guilty of a felony punishable by imprisonment for not more than 2 years or a fine of not more than \$2,000.00, or both.

(ii) If the person was previously convicted of violating or attempting to violate this section, the person is guilty of a felony punishable by imprisonment for not more than 5 years or a fine of not more than \$5,000.00, or both.

(b) For a violation or attempted violation of subsection (1)(b), the person is guilty of a felony punishable by imprisonment for not more than 5 years or a fine of not more than \$5,000.00, or both.

(4) This section does not prohibit a person from being charged with, convicted of, or punished for any other violation of law committed by that person while violating or attempting to violate subsection (1)(a) or (b).

There is no exception in this statute – or any other as far as I know --- for a DTE surveillance device.

Therefore, be advised that my client reserves the right to seek court intervention if his power is cut off, and he reserves the right, if DTE attempts to forcibly install a “smart meter,” to request the issuance of a criminal complaint.

Thank you for your attention to this matter.

Very Truly Yours,

Robert F. Magill, Jr. P16970

Sincerely,

Jim Kress
7630 Salem Woods Drive
Northville, MI 48168
248 446-8997